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Fakultät für Psychologie

Disrupting the Disruption Cycle

Care disruption, aggression, stress and resilience in clients and professional caregivers in youth residential care

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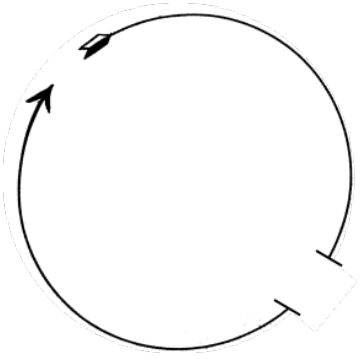
1.0 Abstract

Background: Care disruptions have recurring negative impacts on health and development in many children and adolescent clients living in youth residential care. After difficult living circumstances at home, institutional care aims to provide a supportive setting with uninterrupted care for vulnerable clients. Violations of professional caregivers' personal boundaries, such as client aggression, pose a threat to fulfilling this mandate because care termination sentiments arise, or caregivers burn out and quit. Clients remain stuck in recurring cycles of care and relationship disruptions. What individual resilience factors and intervention strategies at client and caregiver level could break the cycle? *Aim*: To explore emotional and psychophysiological stress reactions in clients and professional caregivers, associated with care disruptions and client aggression, as well as resilience factors that may protect against such stressors. *Methods*: Research was conducted with clients and professional caregivers in German and Swiss youth residential care services. Repeated measures were taken with well-established self and informant report questionnaires regarding adverse life events, aggressive behavior, psychopathological symptoms, quality of life, burnout, resilience, as well as hair samples for the analyses of the hormones cortisol and dehydroepiandrosterone as markers for chronic stress. *Results*: Early care disruptions were associated with later psychopathological symptoms and chronic stress in clients. Verbal and physical client aggression increased the risk of burnout and chronic stress in professional caregivers. At client level, reductions in client aggression were predicted by positive changes in peer relationships, managing school requirements, substance use, suicidal thoughts and perceived self-efficacy. At caregiver level, especially the resilience factors sense of coherence and self-caring behavior lowered burnout risk. Future research and implications for intervention strategies at client and caregiver level, as well as for institutional management are discussed.



2.0 Introduction

A primary aim of youth residential care is to provide a supportive setting to prepare children and adolescent clients for later life stages. The daily work of professional caregivers demands endurance, resilience and emotional engagement. “Develop thick skin, but maintain a soft heart” - yet what to do when work demands begin to exceed personal capacities?

2.1 Background

Clients and professional caregivers in youth residential care are both at risk of experiencing negative effects on health, quality of life and wellbeing in their personal and professional lives. The life-course perspective theory takes a multidisciplinary approach to understanding such health trajectories by considering the mental, physical and social health of individuals over time (e.g. Cullati et al., 2018; Farrington, 2005; Laub & Sampson, 1993). Yet not all individuals are equally vulnerable to health consequences in the face of adversity. As we move through the different life stages, we accumulate various positive and negative effects on health and wellbeing, whereby vulnerability increases with lacking reserves and reduced capacity to replenish them (Cullati et al., 2018). In this respect, predisposition, biological functioning, sociodemographic factors, life events, but also changes in outer and inner circumstances such as work environment, coping skills and relationship quality, hold relevance for health trajectories.

The early accumulation of disadvantageous life circumstances in children and adolescents living in out-of-home care increases their vulnerability to health problems. Studies report that up to 80% of clients in youth residential care suffer from traumatic life events and neglect, along with clinically relevant developmental, behavioral and emotional concerns (Burns et al., 2004; Collin-Vézina et al., 2011; Kisiel et al., 2014; Teicher & Samson, 2016). The average prevalence of clients presenting internalizing and externalizing psychopathological symptoms is estimated around 40-50%, with estimates even higher in closed residential care (Dölitzsch et al., 2014; Gonzalez-Garzia et al, 2017; Jenkel & Schmid, 2018; Keil & Price, 2006; Schmid et al., 2013; Vanschoonlandt et al., 2013).Traditional care concepts oriented around one-size-fits-all approaches, reach quick limits when working with such highly vulnerable clients showing a plethora of psychopathological symptoms.

Modern, individualized care concepts in residential care, such as trauma-sensitive care or schema pedagogy, emphasize all emotional and behavioral expression having relevant reasons, primarily the need for safety, appreciation, participation, transparency and enjoyment. Security and stability can only be provided if the institutional environment is considered a ‘safe place’ for all those living

and working within its walls. In order to provide high-quality, individualized care and develop earlier prevention and intervention strategies, it is of utmost importance to understand the accumulation of stressors and resilience in both clients and professional caregivers

2.1.1 Clients – The stress of disrupted care

Disrupted care impacts healthy development. Especially when associated with early care disruptions, i.e. sudden impaired or broken ties to primary caregivers, adverse childhood experiences have been linked to poorer quality of life, psychopathological symptoms and even changes in the body's underlying psychophysiological stress response (Aarons et al., 2010; Felitti et al., 1998; Hughes et al., 2017; Perez et al., 2011). For children, threats to their attachment figures pose a most potent stressor (Flinn, 2006). Youths in residential care have often experienced multiple adverse childhood experiences including care disruptions (Fischer et al., 2016), for example due to mental or physical illness or incarceration of parents. Such early experiences may color attachment style, emotion regulation or social skills.

Unfortunately, care disruptions not only occur in early childhood, but may extend to out-of-home placements as well. Every fifth residential care placement in Germany is terminated within the first year (Statistisches Bundesamt, 2004, 2010). Such accumulated care disruptions further affect mental and physical health, as well as future partaking in society (Aarons et al., 2010; Perez et al., 2011). Whereas early care disruptions are often linked to primary caregivers' inability to continue care, residential care disruptions are often due to generalized overextension and helplessness in the care system.

Aggressive and antisocial behavior are often reported as major contributors to decisions on placement terminations (Lee et al., 2010; NIOSH, 1996; Perez et al., 2011; Rock et al., 2013; van Rooij et al., 2015; Schmid et al., 2014). If the difficulties are continuous and helplessness increases, the likelihood of a more liberty depriving, closed residential care setting increases (Jenkel & Schmid, 2018). Such measures are justifiable in German and Swiss civil law if the endangerment to self or others is inadequately manageable in an open setting (see BGB § 1631 and ZGB Art. 314). Understanding the development of aggressive behavior holds relevance when considering that stressful care disruptions and placement terminations could be both cause and consequences of such behavior.

Aggressive behavior is demonstrated for a reason. In association with adverse childhood experiences, it may be explained by exposure to inadequate role models or as a self-protective response to avoid further victimization (Campos et al., 1994; Shackman & Pollak, 2014; Shields & Cichetti, 1998; Teisl & Cicchetti, 2008). Sociodemographic factors such as male sex and younger

age have been linked to aggressive behavior (Attar-Schwartz, 2008; Cullerton-Sen et al., 2008; Kornbluh & Neal, 2016; Kotch et al., 2008; Moffitt, 2013; Newton et al., 2000; Oosterman et al., 2007; Schmid & Kölch, 2010; Shackman & Pollak, 2014; Teisl & Cicchetti, 2008; Yoon, 2018; Yoon et al., 2015). From a theoretical perspective, the social information processing model proposes that aggressive behavior is a result of maladaptive evaluations and interpretations of social cues, whereby misperceived hostility and poor emotion regulation plays a significant role (Crick & Dodge, 1994; Dodge & Crick, 1990; Dodge et al., 1995; Dodge & Pettit, 2003; Teisl & Cicchetti, 2008). Whatever the cause or consequence, vulnerable clients demonstrating aggressive behavior often belong to those most sensitive to relationship disruptions and in need of stable care.

2.1.2 Professional caregivers – The stress of caring

The daily work in youth residential care demands 'thick skin'. Employees are likely exposed to clients' verbal and physical aggressive behavior, ranging from verbal abuse, threats and physical attacks to property damage and sexual harassment (Steinlin et al., 2015a; NIOSH, 1996). A survey in youth residential care reports 80% of staff experiencing verbal aggression and about half experiencing physical aggression within a year (Alink et al., 2014). In another study on 319 Swiss professional caregivers, 91% experienced at least one, and 45% three or more types of verbal and physical aggression in the three months prior to the survey (Steinlin et al., 2015b). Considering that many clients suffering from traumatic life experiences, neglect and severe psychopathological symptoms are cared for around the clock in shifts, such boundary violations are often considered an unavoidable occupational hazard (Burns et al., 2004; Collin-Vézina et al., 2011; Kisiel et al., 2014; Schmid et al., 2013; Teicher & Samson, 2016).

However, exposure to the cumulative effects of multiple stressors can leave its mark. When considering that higher frequencies of aggressive encounters increase emotional exhaustion, anxiety and vulnerability, it is unsurprising that professional caregivers report trauma symptoms and high burnout rates in comparison to the general population (Harris & Leather, 2011; Hogh et al., 2005; Steinlin et al., 2015a; Winstanley & Hales, 2014). Burnout is characterized by feelings of disempowerment, emotional exhaustion, cynicism, depersonalization, anxiety and loss of confidence (Berger et al., 2012; Hanson et al., 2015; Franz et al., 2010; Steinlin et al., 2015). Such feelings arise when work demands are perceived to be exceeding personal capacities, which is greatly influenced by institutional climate, resources and support. Studies estimating prevalence of burnout suggest that as many as 50% of child protection workers report burnout symptoms (Steinlin et al., 2015; Conrad & Kellar-Guenther, 2006; Collings & Davis, 2008). Younger and single employees or those just starting out in their careers appear to be more susceptible (Dall'Ora et al.,2015; Lizano & Barak, 2012; Maslach et al., 2001; Wisetborisut et al., 2014).

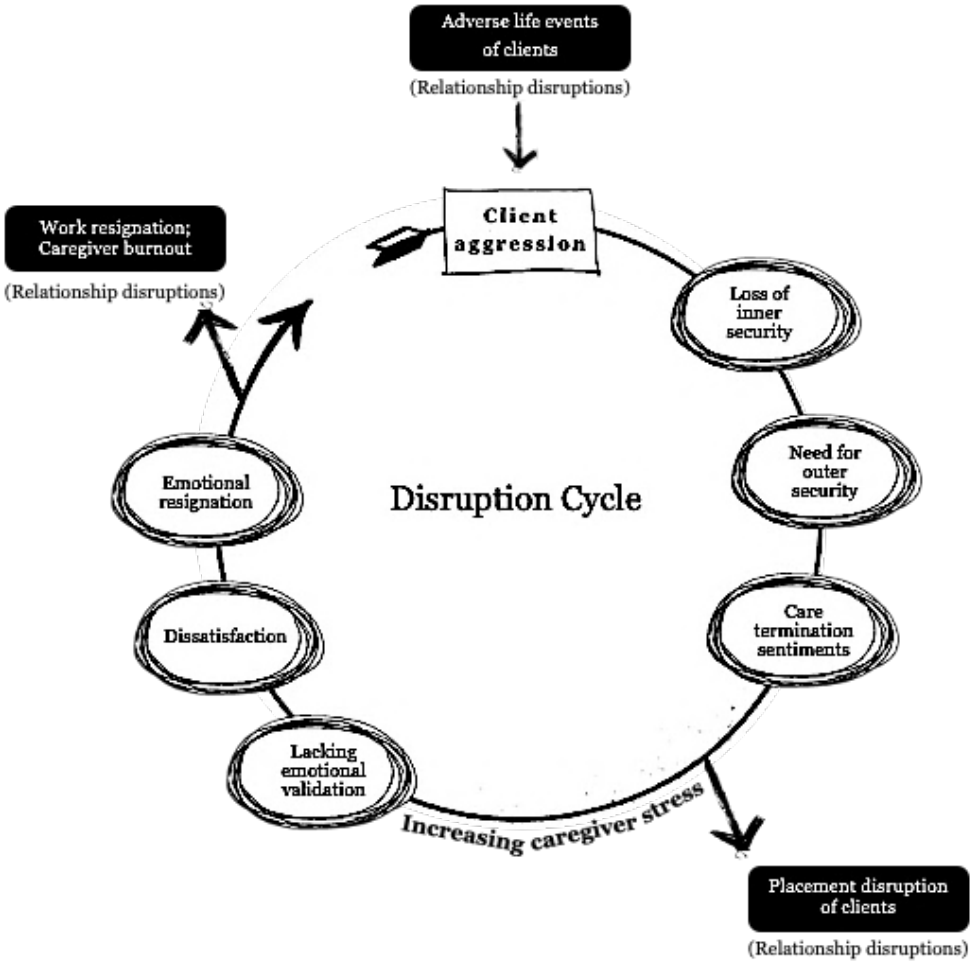


Figure 1. The cycle of disrupted relationships in youth residential care affected by client aggression, caregiver stress and inadequate institutional interventions (adapted from Schmid & Kind, 2017).

With its association to poorer health, psychophysiological stress reactions, work dissatisfaction, lower quality of care, and staff turnover, burnout symptoms hold relevance for care disruptions and placement terminations (Aarons et al., 2010; Hanson et al., 2015; Kim & Stoner, 2008; Mor Barak et al., 2001; Richter & Berger, 2009; Schmid et al., 2015; Staufenbiel et al., 2013; Vives et al., 2015). Care termination sentiments arise when professional caregivers feel insecure, over-whelmed and ill-equipped to manage difficult interactions, and when the risk to self or others is deemed too high (Cooley et al., 2015; Geoffrion & Ouellet, 2013; Izmirian et al., 2018; Lewis et al., 2007; Schmid et al., 2015; Schmid & Kind, 2017; Winstanley & Hales, 2014). If no action is taken, yet professional caregivers do not feel adequately heard or supported by their institution, the lack of security and emotional validation can heighten mental and physical strain, leading to work resignations (Schmid & Kind, 2017). A vicious cycle ensues – aggressive behavior increases the risk for institutional care disruptions, exacerbating further aggressive behavior and further care disruptions (see **Figure 1**).

2.1.3 The body's stress response

Cumulative, severe or chronic stressors leave not only emotional and mental, but also psychophysiological marks. The hypothalamus-pituitary-adrenal (HPA) axis plays a central role in the body's stress response. Common measures of HPA-axis activation are the hormones cortisol and dehydroepiandrosterone (DHEA), presumed to have opposing activating and deactivating effects on the regulation of basal processes, such as immune responses, blood pressure, glucose metabolism, and inflammatory processes (Kamin & Kertes, 2017; Miller, Chen & Zhou, 2007; Staufenbiel et al., 2013). A common measure to test the impact of both hormones simultaneously is the ratio between cortisol and DHEA (Kamin & Kertes, 2017; Qiao et al, 2017). Unlike measurements in saliva and blood which are susceptible to real-time fluctuations, hormone concentrations in hair samples enable assessments of chronic HPA-axis activation over time (Russell et al., 2012).

Exposure to stress can lead to dysregulation of the HPA-axis. Both overfunctioning and underfunctioning are associated with a range of maladaptive health effects (review: Guilliams & Edwards, 2007; Stalder et al., 2017; Staufenbiel et al., 2013). While cortisol is understood to promote psychiatric illness by its neurotoxicity, DHEA reveals neuroprotective effects (Maninger et al., 2009; Vyas et al., 2002,). Studies have found higher cortisol and lower DHEA levels in adults with chronic stress, trauma, burnout and performing shift work, as well as associations with early life stress in children, such as maternal illness (Bunea et al., 2017; Jeckel et al., 2010; Kamin & Kertes, 2017; Penz et al., 2018; Staufenbiel et al., 2013; Wester & van Rossum, 2015; Vives et al., 2015). Data on high-risk youths in institutional care are scarce, but existing literature points towards cortisol alterations in children who have experienced maltreatment, early loss of a caregiver, early out-of-home placements, and more frequent care disruptions (Essex et al., 2002; Laurent et al., 2014; Laurent, 2017; van Andel et al., 2014; van der Vegt, 2009).

2.1.4 Disrupting the cycle

In an interest to improve client care, placement stability and employee health, and to reduce turnover, there is a growing sociopolitical demand to minimize workplace stressors while cultivating individual protective coping strategies. Life course theories suggest prevention strategies that minimize negative effects, while at the same time maximizing positive effects on development. Interventions could be implemented at the client level or at caregiver level.

At the client level, a first approach to reduce stress and disrupt the cycle of disruptions may be to improve aggressive behavior of clients by addressing current outer and inner circumstances. Studies

report that reductions of aggressive behavior are associated with increasing life quality and decreasing comorbid psychopathological symptoms (Dölitzsch et al., 2014; González García et al., 2017; Keil & Price, 2006; Nelson et al., 2014; Schmid et al., 2008; Vanschoonlandt et al., 2013; Villodas et al., 2015). Quality of life is a broad ranging concept that encompasses an individual's multidimensional perception of and satisfaction with their emotional, physical and social life circumstances and functioning in various life domains (Mattejat et al., 1998; WHO, 1995). Collaborations with parents and peer groups, school attendance, reductions in depressive symptoms and other internalizing problems, as well as risky behavior such as substance use, may be highly relevant for favorable behavioral developments (Andrade et al., 2012; Attar-Schwartz et al., 2017; Yampolskaya et al., 2019; Colder et al., 2013, 2017; Erskine et al., 2016; Fanti & Henrich, 2010; Gander et al., 2019). Next to functioning in life domains and psychopathological symptoms, how individuals perceive their circumstances should also be considered.

A second approach to improve aggressive behavior may be to cultivate clients' belief in their own self-efficacy and sense of control (Bandura et al., 1999; Bandura, 2001; Hamill, 2003; Kim & Cicchetti, 2003; Mesurado et al., 2018; Valois et al., 2017). Building on social information-processing model, self-efficacy beliefs, i.e. the subjective belief in the ability to execute the actions required to manage a situation, may mediate the association between aversive circumstances and aggressive behavior (Antonovsky, 1987; Bandura & Locke, 2003; Trap et al., 2015). Evidence suggests that youths with higher perceived self-efficacy have more internal resources and comprehensive coping mechanisms available to them, increasing their capacity to manage difficult circumstances and emotions, and reducing risky, aggressive or delinquent behavior, suicidal thoughts and substance use (Farrell et al., 2010; Hamill, 2003; Saarni, 1999; Valois et al., 2013; 2015; Zullig et al., 2014). In light of these findings, perceived self-efficacy might facilitate coping and reduce aggressive behavior.

At caregiver level, the cycle may be disrupted by focusing on resilience, the phenomenon of 'bouncing back', and adapting in the face of adversity (APA, 2020; Joyce et al., 2018). Widely studied concepts of resilience in the care system include sense of coherence, perceived self-efficacy and self-care practices (e.g. team supervision, work-life balance, physical health, social support), which institutions can encourage and incorporate into their work climate. Sense of coherence reflects the perception of life as being comprehensible, manageable and meaningful (Antonovky, 1987). Previous studies in care professions found higher sense of coherence, self-efficacy and more self-care practices related to fewer stress and burnout symptoms, and more protection against psychological effects of adverse work conditions (Basinska et al., 2011; Duffy et al., 2009; Kokkonen et al., 2014; Mackenzie & Peragine, 2003; Miller et al., 2019; Salloum et al., 2015; Shoji et al., 2016; Feldt,1997). A recent study on professional caregivers even found associations with HPA-axis activation, whereby higher DHEA hormone levels were associated with sense of coherence and self-

caring behavior (Bürgin et al., 2020). Therefore, based on different attitudes and behaviors, individuals may be less likely to feel threatened by adverse work conditions and more readily able to cope with future stressors.

2.2 Research aims

Research in the domain of youth residential care is still rare, and hardly any taking a longitudinal approach that incorporates both emotional and psychophysiological burdens. It remains highly relevant for youth welfare organizations and health policies to bear in mind the importance of stable and consistent care for youths most desperately in need of it, and to understand the emotional and psychophysiological stressors and resilience factors in both clients and professional caregivers. A recent meta-analysis has shown that intervention programs can even lead to the successful normalization of HPA axis functioning in children living in out-of-home care after early adverse life events (Boparai et al., 2018). A deeper understanding of causes and consequences of aggressive behavior and care disruptions may open possibilities for earlier prevention and intervention strategies.

We aimed to address the following questions concerning clients and professional caregivers in Swiss and German youth residential care:

a) Is there an association between early disrupted care, psychopathological symptoms and chronic HPA-axis activation in clients?

b) Does clients' aggressive behavior increase the risk for burnout and chronic HPA-axis activation in professional caregivers?

c) Does improving quality of life, psychopathological symptoms and perceived self-efficacy predict reduced aggressive behavior of clients?

d) Do sense of coherence, perceived self-efficacy and self-care practices protect against developing burnout in professional caregivers?

3.0 General methods

Data stem from a large Swiss-Federal-Government funded model project examining the efficacy of trauma-sensitive care in residential youth welfare institutions in Switzerland and a smaller research project collecting systemic and multi-perspective data of youths living in closed youth residential care in Germany.

In both the Swiss and German youth residential care studies we implemented cross-sectional and repeated measures analyses. Recruiting was continuous within participating institutions. At the client level, self and informant report data was collected with the computerized test-battery EQUALS (see www.equals.ch). At caregiver level, self report surveys and well-established questionnaires were mailed to partaking institutions. In the trauma-sensitive care study, collections of annual hair samples were additionally conducted by the research team (see **Figure 2**).

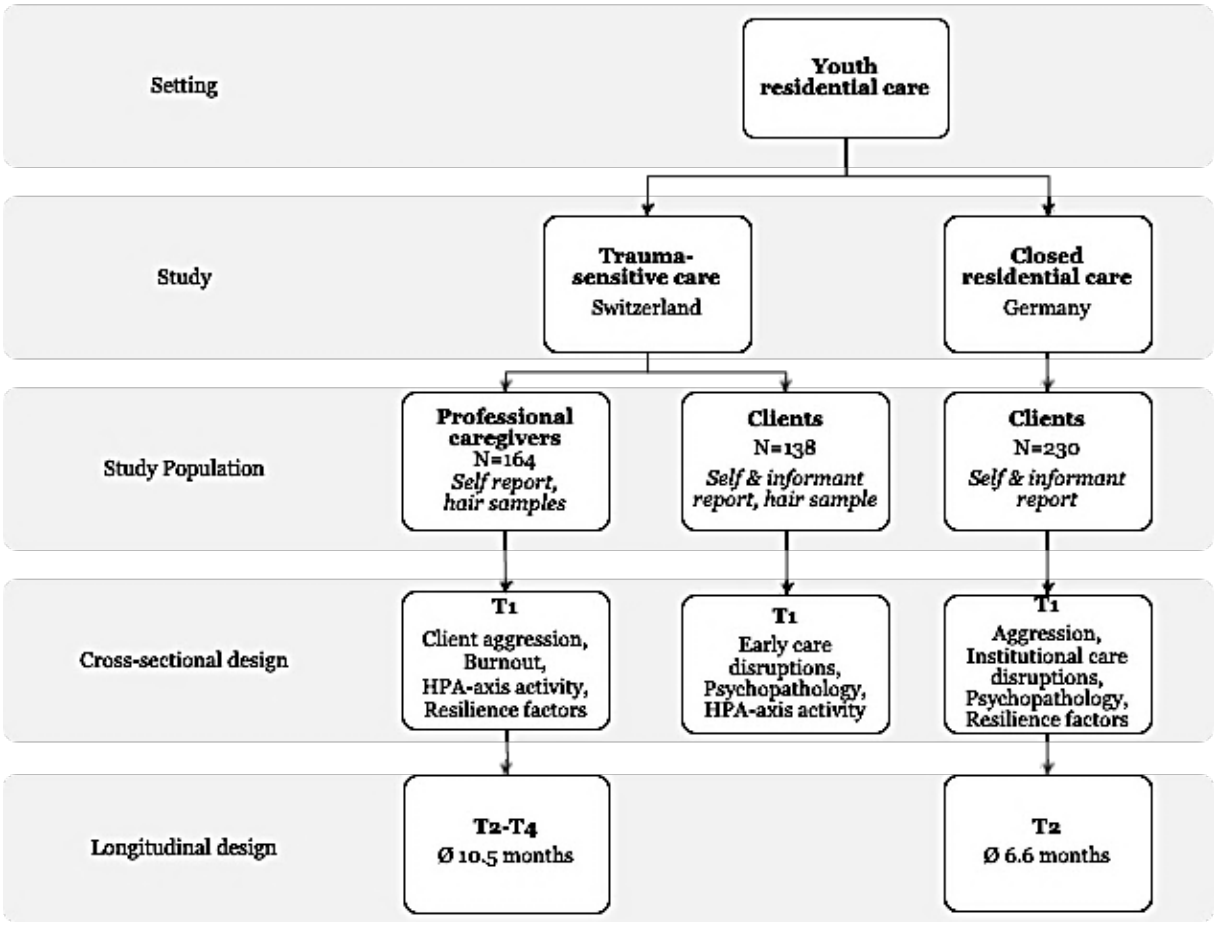


Figure 2. Flow-chart of the total study populations and research designs, including the variables assessed and the average time between repeated measures

4.0 Research studies

4.1 Is there an association between early disrupted care, psychopathological symptoms and chronic HPA-axis activation in clients?

Research Article: Hypothalamic-pituitary-adrenal axis activation in a high-risk sample of children, adolescents and young adults in residential youth care–Associations with adverse childhood experiences and mental health problems.

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Hypothalamic-pituitary-adrenal axis activation in a high-risk sample of children, adolescents and young adults in residential youth care – Associations with adverse childhood experiences and mental health problems

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ABSTRACT

Adverse childhood experiences (ACEs) lead to devastating long-term health consequences that are associated with a dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis. Children and adolescents living in institutional care have an increased risk to experience ACEs, particularly linked to missing continuity of care, and a higher risk for consequences of ACEs such as mental disorders. In order to improve the overall quality of care, it is important to better understand the stress-physiology of this high-risk sample and to identify specific stressors linked to adverse outcomes. Therefore, we assessed ACEs due to missing continuity of care and their association with hair cortisol and DHEA levels in children, adolescents and young adults in institutional care. Results show that ACEs resulting from the family of origin, in detail maternal mental illness, and ACEs due to out-of-home placement, namely frequent change of caregivers, are associated with HPA axis over-activation. HPA axis activation is associated with enhanced mental health problems. These results point towards an association between continuity of care and the stress system of children and adolescents in this high-risk sample. Care concepts that focus on continuity of care might help to reduce these physiological alterations and devastating long-term consequences following ACEs.

1. Introduction

Adverse childhood experiences (ACEs) affect life on multiple do- mains. The cumulation of ACEs are associated with adverse outcomes, such as mental and somatic health problems, adverse health behavior and a poor quality of life (Felitti et al., 1998; Gilbert et al., 2009; Hughes et al., 2017), as well as with a reduced life expectancy for up to 20 years (Brown et al., 2009). Some types of ACEs affect a child directly as does childhood maltreatment, however, many ACEs linked to household dysfunction affect children on a more indirect way e.g. se- vere mental illness, substance abuse or incarceration of a caregiver and parental loss due to death or separation

ACE-induced alterations of the hypothalamic-pituitary-adrenal (HPA) axis are suggested as one important pathomechanism leading to devastating long-term consequences. Early-life stress, caused by ACE, has been shown to result in an activation of the hypothalamic-pituitary- adrenal (HPA) axis (Bunea et al., 2017), a major stress response of the body. Especially in children, this can lead to long lasting health con- sequences (Gunnar and Quevedo 2006). Chronic activation of the HPA- axis, going along with an altered cortisol secretion, is known to con- tribute to neural atrophy in the hippocampus, amygdala activation, immune system suppression, and cognitive and physical deficits (Doom and Gunnar 2013). Furthermore, alterations of the HPA-axis are linked to depression (Hankin 2012) and other mental disorders (Wingenfeld and Wolf 2011; Berger et al., 2018), as well as to somatic health problems, such as increased cardiovascular risk (Cozma et al., 2017), cancer and metabolic diseases (Kumari et al., 2011; Volden and Conzen 2013).

There is a growing body of literature showing that child maltreatment leads to significant alterations in the HPA axis (De Bellis

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et al. 1994; Heim et al., 2000; Bruce et al., 2009; Harkness et al., 2011), which are still present in adulthood (Heim et al., 2000; Carpenter et al., 2007; van der Vegt et al. 2009). Even though studies focusing on ACEs due to missing continuity of care and HPA-dysregulation are less pro- minent compared to studies on ACEs linked to child maltreatment, there is some literature that points towards an association of maternal illness with higher cortisol levels in children (Essex et al., 2002; Laurent et al., 2014; Laurent 2017). Whereas usually not included into classical ACEs scores, out-of-home placement itself can be considered as early-life adversity (Dahmen et al., 2018). As for children, the most potent stressors often comprise any threats to their connection with attachment figures (Flinn 2006), it is not surprising that adopted chil- dren were shown to have higher cortisol levels than children living with their biological parents (Gunnar et al., 2009).

Children and adolescents living in institutional care have a higher risk of experiencing ACEs (Fischer et al., 2016) as well as to suffer from their long-term consequences as for instance mental disorders (Fazel et al., 2008; Schmid 2008; Humphreys et al., 2015; Ludtke et al., 2018). Psychopathology again is linked to significant poorer quality of life in institutionalized adolescents (Gander et al., 2019). Therefore, it is important to understand the impact of different ACEs in order to identify the most significant stressors and in this way to identify the children at highest risk of adverse outcomes. This knowledge is needed to develop targeted strategies and care concepts to meet the specific needs of these children in order to reduce the devastating consequences of ACEs. This is in particular important as a recent meta-analysis has shown that a successful normalization of HPA axis function is possible via intervention programs in children at institutional or foster care and community settings after childhood adversity (Purewal Boparai et al., 2018). This is why analyzing stress physiological measures of children in out-of-home placement is needed as stress-associated biological markers may be relevant for the evaluation and quality management of intervention programs. Unfortunately, data regarding HPA axis func- tioning in such high risk samples of children and adolescents in in- stitutional care are scarce. The existing literature points towards HPA- axis alterations in adoptees if maltreatment (van der Vegt et al. 2009) or early loss of a caregiver, a younger age at first placement, and a higher number of placements (van Andel et al. 2014) was reported. Im- portantly, the results appear contradictory showing e.g. decreased dif- ferent morning cortisol levels in the case of severe neglect but increased levels in the case of moderate neglect (van der Vegt et al. 2009). The systematic review by van Andel and colleagues points out that it is hard to compare results from different studies regarding HPA axis alterations in children and adolescents in institutional care yet due to methodo- logical differences that can strongly affect salivary cortisol – the most often used measure - that underlies significant diurnal changes (van Andel et al. 2014). Therefore, we aimed to assess HPA-axis acti- vation in our study by measuring cortisol and dehydroepiandrosterone (DHEA) levels in hair samples of the participants. This method enables to assess the accumulation of cortisol over time and thereby might overcome bias due to real-time fluctuations that are present in plasma and salivary cortisol levels (Russell et al., 2012).Activation of the HPA axis starts by release of corticotropin-releasing hormone (CRH) in the hypo- thalamus, and subsequent production and release of adreno- corticotropic hormone (ACTH) in the anterior pituitary to stimulate the production of adrenocorticotropic hormone (ACTH). ACTH initiates synthesis and release of cortisol and DHEA in the adrenals. Both are discussed to mediate the long-term effects of stress (Kamin and Kertes 2017). DHEA and cortisol have opposing effects – while cortisol is thought to promote psychiatric illness i.e. by its neurotoxicity (Vyas et al., 2002), DHEA reveals neuroprotective effects (Maninger et al., 2009). A common measure to test the impact of both hormones simultaneously - and thereby HPA axis activation - is the ratio between cortisol and DHEA (Kamin and Kertes 2017; Qiao et al., 2017). To the best of our knowledge, there is no study yet that assesses HPA axis activation via hair samples in children and adolescents living in institutional care in dependence of household dysfunction.

Therefore, in our present analysis, we aimed to assess stress phy- siological measures via hair analysis in children, adolescents and young adults in institutional care as a first pilot study. We hypothesized that ACEs linked to household dysfunction in the family of origin and in out- of-home-placement and mental health problems as typical con- sequences of ACEs may affect HPA axis regulation in our sample.

Moreover, to the best of our knowledge, this is a further study that aims to assess HPA axis dysregulation in children adolescence and young adults that have been placed into institutional care in Switzerland. A Swiss national survey in over sixty residential care in- stitutions found that 80% of children and adolescents reported having been exposed to traumatic experiences (Schmid et al., 2013; Fischer et al., 2016). These often multiple interpersonal traumatic ex- periences were associated with mental health problems beyond core symptoms of PTSD (Fischer et al., 2016). The majority showed clini- cally relevant internalizing and/or externalizing behavior (Dölitzsch et al., 2014; Euler et al., 2015). In this sample of inter- nalizing and externalizing pathology was also related to a reduced Quality of Life (Gander et al., 2019). About a fifths of children and adolescents in these institutions report occasional and repetitive non- suicidal self-injury (NSSI), which was shown to be associated with de- pressive, conduct and substance abuse disorders (Lüdtke et al., 2017). Unexpected dropout from placements in youth residential care in- stitutions were strongest predicted by psychopathic traits besides age (Schmid et al., 2014).

2. Methods

This study was part of a larger Swiss-Federal-Government funded model project examining the efficacy of trauma-informed care in re- sidential youth welfare institutions in the German speaking part of Switzerland. The 14 institutions included in the sample accommodate children, adolescents, and young adults between 7 and 25 years of age of whom over a third have a criminal record or exhibit severely dis- ruptive social behavior and about 80% report on traumatic experience. Of the whole sample, 1.4% has been accommodated in an institution before. In dependence of the specific institution, the main accom- modation reasons differed. For the total sample, 55.6% were accom- modated due to criminal reasons, 26.4% were accommodated ac- cording to civil law and 18.0% due to other reasons. The complete design of the overall model project and detailed sample characteristics are described elsewhere (Schmid et al., 2017). All participants were informed about the study and gave written informed consent. The leading ethics committee of Basel, as well as the ethics committees of the cantons Bern, St. Gallen, Aarau, and Zürich approved the project.

2.1. Participants

A total of $N = 138$ (100%) participants were enrolled in the study. 91 (65.5%) provided hair samples and were included into the present sample. The results presented in the results section refer to these 91 participants. One reason was that especially male adolescents had too short haircuts ($N = 16$; 11.6%) and other participants declined without a declaration of reasons ($N = 21$; 15.2%). We hypothesized that re- jections were due to females being afraid of a bare spot in the haircut or that participants were afraid of being screened for drug usage. Moreover, the rest of the missing data ($N = 10$; 7.3%) were due to the fact that participants left their institution in the time interval between psychometric assessment and hair analysis or missed the days of hair assessment due to disallowed absence. Missing data analyses revealed that hair cortisol concentration data were missing completely at random. The mean age of the 91 subjects included in the present ana- lyses was 16.05 ($\pm$ 2.32) years with a range from 7 to 21 years. 50
participants were female (54.9%) and 41 male (45.1%; see table 1).

Table 1
Sample characteristics.

Age	
Mean in years (SD)	16.05 (2.32)
Gender	
Female (N,%)	50 (54.9)
Male (N,%)	41 (45.1)
Born in Switzerland (N,%); total *N* = 86	67 (77.9)
ACEs related to missing continuity of care (N;%)	
Death of caregivers or siblings, total *N* = 69	12 (17,4)
Frequent change of Caregiver, total *N* = 65	27 (29.7)
Addiction of the mother, total *N* = 42	12 (28.6)
Addiction of the father, total *N* = 35	12 (34.3)
Incarceration of the mother, total *N* = 36	0 (0)
Incarceration of the father, total *N* = 33	7 (21.7)
Maternal mental illness, total *N* = 38	13 (34.2)
Paternal mental illness, total *N* = 35	11 (39.3)
CBCL (N,%), total *N* = 71	
Total problem score	54 (76.1)
Aggressive behavior	23 (32.4)
Anxious/depressed	22 (31.0)
Attention problems	28 (39.4)
Rule-breaking behavior	33 (46.5)
Somatic complaints	15 (21.1)
Social problems	15 (21.1)
Thought problems	40 (56.3)
Withdrawn/ depressed	18 (25.4)
Stress Markers (hair), total *N* = 91	
Cortisol in pg/mg (M, SD)	7.16 (6.03)
DHEA in pg/mg (M, SD)	9.30 (8.67)
Ratio Cortisol/DHEA (M, SD)	1.06 (0.95)
Log Ratio Cortisol/DHEA (M, SD)	−0.10 (0.33)

Table 1: Characteristics of the sample, presented as mean (M) and standard deviation (SD) for age and number of subjects (%) for other characteristics. Only participants with Cortisol/DHEA values were included (see total N in dependence of the measure).

2.2. Measures

ACEs were assessed with questions that were designed specifically for a sample living in out-of-home placement. The questions comprised mental illness of parents as well as death of family members and were answered by each individual's responsible social pedagogue. Answer categories for each incident was "yes", "no" or "unknown", unknowns were treated as missing values resulting in different sample sizes for each independent incident.

Emotional problems, physical complaints and behavioral problems were assessed with the Child Behavior Checklist (CBCL 4–18), an in- ternationally renowned questionnaire that assesses 120 symptoms which are comprised in 8 subscales (aggressive behavior, anxious/de- pressed, attention problems, rule-breaking behavior, somatic com- plaints, social problems, thought problems, withdrawn/depressed) and 1 total problem score. The total problem score exhibit excellent internal consistency of >0.85 for total problem score and >0.80 for most subscales (Dopfner et al., 1994). The CBCL was answered by each in- dividuals responsible social pedagogue.

2.3. Hair cortisol and DHEA analyses

Strands of hair (1.5 cm long) adjacent to the scalp were collected from the posterior vertex region. Given an average growth rate of 1 cm/ month, the cumulative cortisol and DHEA exposure over the last 6 weeks is assumed to be indexed (Stalder and Kirschbaum 2012). Hair cortisol and DHEA were extracted in line with the protocol reported by Gao et al. (Gao et al., 2013). Cortisol levels were determined using a commercially available high-sensitivity (analytical sensitivity 0.007 µg/ dL) cortisol enzyme immunoassay kit (Salimetrics Europe, UK) and DHEA levels using a Salivary DHEA ELISA kit (Salimetrics Europe, UK) according to the manufacturer's protocols. Evaporated samples were resuspended in assay diluent provided by the manufacturer. The intra- assay and inter-assay coefficients of variation of these assays are below 9%. Samples were analyzed in duplicate, and mean values of respective concentrations were calculated in pg/mg hair and used in statistical analyses. All measures were performed in blinded fashion.

2.4. Statistical analyses

All analyses were conducted using SPSS version 21. Because cor- tisol, DHEA and cortisol/DHEA ratio was not normal distributed, all values were log-transformed, as suggested for the use of hormone ratios (Sollberger and Ehlert 2016). After log-transformation, data were nor- mally distributed. Comparisons of means were performed via t-tests or one-factorial analysis of variance. Linear regression analyses were performed to assess the association between cortisol, DHEA and CBCL scales. Missing data were analyzed via Little's Missing Completely at random test.

3. Results

Of the 91 individual that were included into the study, a total of $N = 11$ (12.2%) of the participants reported to have experienced a death of a caregiver or a sibling. Frequent changes of caregivers ex- perienced of 27 participants (29.7%). Paternal addiction was experi- enced by 12 (28.6%) and maternal addiction by 12 (34.3%) partici- pants. While no participant had an incarcerated mother, 7 (21.7%) reported to have an incarcerated father. Mental illness of the mother was reported for 13 participants (39.3%) and paternal mental illness for11 (39.3%).

A total of $N = 54$ (76.1%) of the participants showed clinically relevant behavioral problems in the CBCL. In detail, 23 (32.4%) showed clinically relevant aggressive behavior. Rule-breaking behavior was present in 33 (46.5%) participants and social problems in 15 (21.1%). Clinically relevant attention problems was shown by 28 (39.4%) par- ticipants, 40 (56.3%) had thought problems and 15 (21.1%) revealed somatic complaints. Clinically relevant symptoms of anxiety and de- pression were present in 22 participants (31.0%) and 18 participants (25.4%) showed withdrawn and depression (see table 1).

3.1. Differences in cortisol, DHEA and cortisol/DHEA ratios in association with ACEs related missing continuity of care

The ratio of cortisol/DHEA was significantly elevated if participants reported mental problems of their mother ($M = 0.09 \pm 0.35$ vs. -0.18 ± 0.31, $p = 0.02$) while no difference in the case of mental illness of the father was seen (-0.15 ± 0.21 vs. -0.18 ± 0.24, $p = 0.80$). If frequent change of caregivers was reported, cortisol/ DHEA ratio was significantly elevated (0.03 ± 0.36 vs. -0.17 ± 0.30, $p = 0.02$, see table 2). No differences in cortisol/DHEA ratios were seen regarding the experience of a death of a caregiver or sibling, addiction or incarceration of one parent. While a borderline significant trend was seen regarding higher cortisol levels in subejctes who have experienced the death of a caregiver or siebling (1.69 ± 0.71 vs. 1.22 ± 0.86, $p = 0.05$), no significant differences were seen for cortisol and DHEA in dependence of the occurrence of other ACEs related to missing continuity of care (for details see table 2).

3.2. Differences of CBCL total score in association with ACEs related missing continuity of care

The CBCL total score was significantly elevated if participants re- ported mental health problems of their father ($M = 68.36 \pm 6.25$ vs. 61.80 ± 8.93, $p = 0.04$) while no difference in the case of mental illness of the mother was seen ($M = 65.3 \pm 11.47$ vs. U 61.4 ± 18.34, $p = 0.26$). If frequent change of caregivers was re- ported, CBCL total score was significantly elevated ($M = 68.92$

HPA-axis activation in dependence of ACEs linked to missing continuity of care.

		Log Cortisol/DHEA			Log Cortisol			Log DHEA		
		M	SD	*p-value*	M	SD	*p-value*	M	SD	*p-value*
Death of caregivers or siblings	No	−0.10	0.30		1.22	*0.86*		*1.92*	*0.68*	
N = 69	Yes	−0.21	0.50	*0.32*	1.69	*0.71*	*0.05*	*1.70*	*1.12*	*0.36*
Addiction of the mother	No	−0.20	0.27		1.59	*0.92*		*2.06*	*0.76*	
N = 42	Yes	−0.17	0.32	*0.72*	1.35	*0.68*	*0.43*	*1.74*	*0.89*	*0.25*
Addiction of the father	No	−0.16	0.27		1.61	*1.00*		*1.97*	*0.75*	
N = 35	Yes	−0.19	0.23	*0.75*	1.74	*0.72*	*0.69*	*2.17*	*0.65*	*0.44*
Maternal mental illness	No	−0.18	0.31		1.56	*0.94*		*1.98*	*0.79*	
N = 38	Yes	0.09	0.35	*0.02**	1.78	*0.69*	*0.46*	*1.58*	*0.74*	*0.14*
Paternal mental illness	No	−0.18	0.23		1.70	*1.04*		*2.10*	*0.76*	
N = 28	Yes	−0.15	0.21	*0.80*	1.70	*0.64*	*1.00*	*2.05*	*0.64*	*0.87*
Frequent change of caregiver	No	−0.17	0.30		1.53	*0.78*		*1.94*	*0.80*	
N = 65	Yes	0.03	0.36	*0.02**	1.83	*0.75*	*0.13*	*1.77*	*0.83*	*0.43*

Table 2: Means of cortisol/DHEA ratio, cortisol and DHEA in dependence of the occurrence of different ACEs linked to missing continuity of care. Presented as mean (M) and standard deviation (SD). As no one in the sample reported to have an incarcerated mother, this analysis was not conducted. * $p < 0.05$.

Table 3
Association of Mental health problems and ACEs linked to missing continuity of care.

		CBCL total score		
		M	SD	*p-value*
Death of caregivers or siblings	No	65.81	8.87	*0.23*
N = 60	Yes	61.88	6.38	
Addiction of the mother	No	63.26	8.66	*0.80*
N = 38	Yes	62.55	5.70	
Addiction of the father	No	65.56	7.84	*0.24*
N = 30	Yes	62.26	6.73	
Maternal mental illness	No	61.41	8.34	
N = 44	Yes	65.33	11.47	*0.26*
Paternal mental illness	No	61.80	8.93	
N = 26	Yes	68.36	6.25	*0.04**
Frequent change of caregiver	No	62.47	8.95	
N = 58	Yes	68.92	7.26	*0.01**

Table 3: Means of CBCL total score in dependence of the occurrence of different ACEs linked to missing continuity of care. Presented as mean (M) and standard deviation (SD). As no one in the sample reported to have an incarcerated mo- ther, this analysis was not conducted. * $p < 0.05$.

± 7.26 vs. 62.47 ± 8.95, $p = 0.01$, see table 3). No differences in CBCL total score was seen regarding the experience of a death of a caregiver or sibling, addiction or incarceration of one parent (for details see table 3).

3.3. Association of cortisol, DHEA and cortisol/DHEA ratios and mental health problems

Mental health problems were associated with elevated cortisol/ DHEA ratios ($b = 0.28$, $p = 0.02$). Furthermore, elevated cortisol/ DHEA ratios were significantly associated with higher anxious/de- pressive symptoms ($b = 0.29$, $p = 0.01$), higher attention problems ($b = 0.35$, $p = < 0.01$), higher social problems (0.31, $p = 0.01$) and higher thought problems ($b = 0.31$, $p = 0.01$). No significant asso- ciations were observed between cortisol/DHEA ratios and aggressive behavior, rule-breaking behavior, somatic complaints and symptoms of withdrawal/depression. Cortisol alone was associated significantly with thought problems ($b = 0.26$, $p = 0.03$) and DHEA with attention problems ($b = -0.26$, $p = 0.03$)(for details see table 4).

4. Discussion

The aim of the present study was to assess HPA-axis dysregulation in a high-risk sample of children in institutional care and to assess the association with childhood adversity and mental health problems. Our results provide first evidence for a significant association of elevated hair cortisol/DHEA ratios with maternal mental illness and frequent change of caregivers as well as mental health problems in children, adolescents and young adults in institutional care.

Cases of missing continuity of care are mostly related to loss or impaired relation to a caregiver. Caregiver-child interactions are of pivotal meaning for the survival and healthy development of young children (World Health Organization 2004). Therefore, out-of-home placement, going along with a significant impairment of the parent- child interaction, can be considered as an ACE itself. Furthermore, children in institutional care are not only at higher risk to have ex- perienced maltreatment in their family of origin, but are also at a higher risk of experiencing psychosocial deprivation (Merz and McCall 2010) and child maltreatment during institutional care (Lueger-Schuster et al., 2018). This impacts child development (MacLean 2003) and results in a higher risk for several negative outcomes in later life, including mental health problems, chronic diseases, social isolation (Sigal et al., 2003) and lower socioeconomic status (Reilly 2003; Brännström et al., 2017). Gunnar et al. showed that 6–12 years old children exhibited higher cortisol levels when they were raised up in orphanages in their first years of life compared to children who were adopted early (Gunnar et al., 2001). It is important to identify factors that further increase the risk of adverse outcomes for these already disadvantaged children and adolescents and to subsequently design targeted strategies of support.

Mental illness of parents is known as one main risk factor for chil- dren to develop mental disorders themselves (Rasic et al., 2014), however data regarding cortisol levels of children of mentally ill par- ents are scarce. Essex and colleagues were able to show that pre- schoolers exhibited higher cortisol levels when maternal – but not pa- ternal – depression beginning in infancy was reported (Essex et al., 2002). In a recent study, Zhang and colleagues were able to demon- strate that only current maternal - not paternal - depression affects HPA axis function of the offspring (Zhang et al., 2018), going align with the here presented results.

Parenting skills and parent child-interactions can be affected by maternal mental illness (Widom et al., 2018). The Mother-child inter- action and maternal support is associated with the HPA axis activation in children (Smeekens et al., 2007; Hostinar et al., 2015), which might explain the here presented activation of the HPA axis. Other factors next to altered interaction with the child and parenting skills – that also might impact the HPA axis – are genetic and neurobiological factors, and numerous psychosocial risk factors including low socioeconomic status and social support (van Santvoort et al. 2015).

The present analysis shows that maternal mental illness is asso- ciated with HPA axis activation even after out-of-home placement. This result points towards the importance of maternal mental health for the offspring and furthermore its long-lasting impact on the child's phy- siolog

Table 4
Association of HPA-axis activation and mental health problems.

CBCL ($N = 71$)	*Log Cortisol/DHEA* b	*p-value*	R^2	*Log Cortisol* b	*p-value*	R^2	*Log DHEA* b	*p-value*	R^2
Total problem score	0.28	*0.02**	*0.075*	*0.15*	*0.21*	*0.02*	*−0.12*	*0.33*	*0.01*
Aggressive behavior score	0.14	*0.25*	0.02	0.11	0.35	0.01	−0.02	0.87	0.00
Anxious/depressed score	0.29	*0.01**	0.09	0.12	0.33	0.01	−0.17	0.15	0.03
Attention problems score	0.35	*<0.01***	0.11	0.01	0.42	0.01	−0.26	0.03*	0.07
Rule-breaking behavior score	0.29	*0.29*	0.02	0.13	0.28	0.02	0.01	0.92	0.00
Somatic complaints score	0.10	*0.41*	0.01	0.17	0.16	0.03	0.09	0.48	0.01
Social problem score	0.31	*0.01**	0.09	0.18	0.14	0.03	−0.13	0.27	0.02
Thought problem score	0.31	*0.01**	0.08	0.26	0.03*	0.07	−0.04	0.77	0.00
Withdrawn/depressed score	0.01	*0.42*	0.01	−0.01	0.92	0.00	−0.11	0.34	0.01

Table 3: Association of CBCL total problem score, CBCL subscores and Log Cortisol/DHEA ratio via linear regression analysis. *b* = standardized coefficient. R^2 = Nagelkerkes R^2; * $p < 0.05$, ** $p < 0.01$.

Two main critical periods are discussed for the development of HPA axis regulation – the first months of life, when the HPA axis is still immature, and puberty, when a reorganization of the axis takes place (Gunnar and Quevedo 2006). In the first months of life, secure at- tachment relationships and even small variations in caregiving are re- flected in HPA axis reactivity (Albers et al., 2008). A pubertal increase in HPA-axis reactivity makes this period very vulnerable for stress ex- posure and consequently development for psychopathology (Andersen and Teicher 2009).

While the first vulnerable period might explain the long-lasting al- teration that were seen in children with a mentally ill mother, the mean age out-of-home placement in our sample of was 14 years and thereby in the second vulnerable time of HPA axis development: puberty. This might explain the HPA axis alterations that were seen if frequent change of caregiver was present. In a systematic review that included nine analyses, Johnson and colleagues showed alterations in HPA axis regulation after early loss of a caregiver and a higher number of pla- cements in foster children before puberty (van Andel et al. 2014). The here presented data underline these results and extend them to ado- lescents and institutional care.

Interestingly, while there is existing evidence pointing towards al- tered cortisol levels in adults who experienced severe maltreatment during childhood and lived in out-of-home care (van der Vegt et al. 2009), our data showed no significant alterations in HPA-axis activation in dependence of death of a caregiver or sibling or addiction of the parents. This is surprising but may be due to the low number of participants in our study. Furthermore, van der Vegt and colleagues used saliva cortisol, which underlies significant diurnal changes. While in their study severe maltreatment was associated with decreased cor- tisol levels, moderate maltreatment was associated with increased cortisol (van der Vegt et al. 2009). While in our analysis hair cortisol and DHEA was used, this different methodology may impair the com- parability and explain the different results. Further analyses comprising hair analyses and furthermore assessing the ratio cortisol and DHEA in bigger samples are needed to further assess the impact of childhood adversity in stress physiology in these high-risk sample of children and adolescents in out-of-home placements.

The problems following HPA axis dysfunctions are widely known and include neurobiological alterations, immune system suppression, cognitive and physical deficits (Doom and Gunnar 2013), as well as enhanced cardiovascular risks (Cozma et al., 2017). Furthermore, there is a known association between cortisol and mental health problems including depression (Hankin 2012), psychosis and other mental dis- orders (Wingenfeld and Wolf 2011; Berger et al., 2018). In line with these findings, our results showing an association of the cortisol/DHEA ratio with mental health problems, are not surprising. Next to an as- sociation with the CBCL total score, a significant association of cortisol/ DHEA ratios was observed with higher scores in anxiety/depression, social problems, attentive problems and thought problems. Even
though never assessed in a high risk sample of children, adolescents and young adults in institutional care, there are several studies showing that alterations in HPA axis activation in adolescents are associated with anxiety, suspiciousness and impaired stress tolerance (Corcoran et al., 2012), attention symptoms (Vogel et al., 2017; Schloss et al., 2018), depression (Lopez-Duran et al., 2009) and psychotic symptoms (Walker et al., 2010; Moskow et al., 2016). Nevertheless, this associa- tion with mental health problems underlines the relevance of HPA axis activation for mental health even in this high-risk sample of children, adolescents and young adults. Furthermore, our analysis is the first that shows this association for HPA markers in hair samples of in- stitutionalized children, overcoming potential bias due to diurnal changes and subsequent methodological bias.

Taken together, the present analysis shows that children, whose mothers suffers from a mental illness are at higher risk for HPA axis alterations and thus are potentially prone to its fatal long term con- sequences for health and life quality. Next to adversity in the family of origin, we identified frequent changes of caregivers to be associated with HPA axis activation.

A systematic review by Slopen and colleagues, that included the results of 8 trials, demonstrates that psychosocial interventions can alter cortisol activity (Slopen et al., 2014). The samples were partly in foster care, institutional care or from high-risk families. Interventions mainly targeted caregivers by giving e.g. educational trainings, at- tachment-based therapy and relaxation techniques. A recent meta- analysis confirmed a normalization of HPA axis function after inter- vention programs in children in foster or institutional care after ad- versity (Purewal Boparai et al., 2018). Even though these interventional studies encompassed samples of younger age, these results are pro- mising as they indicate that it might be possible to affect HPA axis dysregulation following childhood adversity.

Nevertheless, there are some major limitations to consider. First, samples sizes for reported analyses varied between 28 and 91 partici- pants due to missing data on the respective variables. Because of this low sample size, no control variables such as age and sex were included into the analyses, which may bias the results as our sample is quite heterogeneous regarding these parameters. Even though a more homogenous sample may provide an advantage in the biological ana- lyses, the strength of our sample is – next to the rarity of analyses of youths living in out-of-home care – its diversity and external validity. An important limitation of our study is that - despite the fact that by analyses of cortisol and DHEA levels in hair a time period that can be analysed - it has a cross-sectional design and causality cannot be de- duced. Furthermore, it has to be stated that even though the ratio of cortisol and DHEA out of hair is a valid method (Russell et al., 2012), it is only one way to assess HPA axis activation. Other possible ways encompass e.g. sympathetic reactivity (Oosterman et al., 2010). Moreover, mental health problems were assessed by the CBCL, an in- ternationally established questionnaire for mental health problems (Dopfner et al., 1994), but not by ICD diagnoses. For the assessment of ACEs linked to missing continuity of care, questions that specifically

target the situation of institutionalized children/adolescents/adults were used, not a standardized questionnaire. Furthermore, ACEs related to household dysfunction in the family of origin and during institutional care were assessed by caregivers, not by children, adolescents and young adults themselves. However, the presented results give a mean- ingful insight into the stress physiology of children, adolescents and young adults placed in out-of-home care.

Taken together, our study shows for the first time that ACEs in the family of origin, in detail mental illness of the mother, and ACEs linked to out-of-home placement, namely age of out-of-home placement and frequent change of caregivers, are associated with HPA axis activation in children, adolescents and young adults in institutional care. Interestingly, these psychosocial risk factors influence the HPA axis of children and adolescents even months to years after admission to re- sidential care facilities. Furthermore, the demonstrated HPA axis acti- vation is associated with enhanced mental health problems in this sample. For a better understanding of these complex associations, longitudinal studies regarding the development of psychopathology and HPA axis activity are needed.

Based on our results, when children are already at high risk, e.g. coming from families with mentally ill mothers, permanency planning that avoids frequent changes of caregivers should be one main priority in order to reduce the physiological changes and devastating con- sequences that are going along with these adverse experiences. Trauma- informed care concepts and child and adolescent psychiatric and psy- chotherapeutic interventions may be one step towards a better care for these children and adolescents at high risk. Trauma-informed care concepts aim to provide security for children and adolescents who have experienced ACEs and furthermore focus on empowerment (Bowen and Murshid 2016). Both factors, as well as psychotherapy, were shown to be able to ameliorate the biological impacts of childhood adversity (Purewal Boparai et al., 2018).

Author's contributions statements

JMF and MS conceived the study. NK, DB and CD contributed to data collection and data analysis. AE performed the laboratory proce- dures. VC performed final data analyses and took the lead in writing the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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Declaration of Competing Interest

The authors state that they have no conflict of interests.

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4.2 Does clients' aggressive behavior increase the risk for burnout and chronic HPA-axis activation in professional caregivers?

Research Article: Verbal and physical client aggression–A longitudinal analysis of professional caregivers' psychophysiological stress response and burnout.

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Verbal and physical client aggression – A longitudinal analysis of professional caregivers' psychophysiological stress response and burnout

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ABSTRACT

Objective: We investigated the impact of verbal and physical client aggression on risk of developing high hair cortisol concentration (HCC) as an indicator of chronic stress exposure and burnout in a Swiss population of professional caregivers working in youth residential care.

Method: Participants (n = 121; 62.0% women) reported on client aggression and burnout symptoms and pro- vided hair samples at four annual sampling points. HCC was determined in the first 1.5 cm hair segment. Sociodemographic variables, private stressors, burnout symptoms, and HCC were compared between partici- pants reporting either 'no aggression', 'verbal' aggression, or 'verbal + physical' aggression. Cox proportional hazards regressions were calculated to compute hazard ratios (HR) and 95% confidence intervals (CI) for the association between client aggression and risk of high HCC or burnout over the course of three years.

Results: Professional caregivers reporting 'verbal + physical' aggression had higher HCC, more cognitive burnout symptoms, and greater burden in interpersonal domains. Both 'verbal' and 'verbal + physical' aggres- sion were positively associated with burnout risk (verbal: HR = 1.83; 95% CI = 1.27–2.65; verbal + physical: HR = 2.44, 95% CI = 1.56–3.84). 'Verbal + physical' aggression was positively associated with risk of high HCC (HR = 1.58; 95% CI = 1.07–2.36).

Conclusions: This longitudinal analysis suggested that psychophysiological stress response is primarily associated with combined verbal and physical aggression. The emotional wearing-down associated with verbal aggression should however not be disregarded. Our exploratory findings could have implications for youth welfare policy, clinical child psychiatry, and future research.

1. Introduction

Employees in youth welfare institutions and inpatient child and adolescent psychiatric units are at high risk of being confronted with verbal and physical client aggression (Steinlin et al., 2015a). Such ex- periences range from verbal abuse, threats, and physical attacks to property damage and sexual harassment (NIOSH, 1996), and may contribute to burnout symptoms and negative somatic and mental health outcomes. Disadvantageous coping with client aggression is as- sociated with work dissatisfaction and employee turnover (Schmid et al., 2015). Feeling inadequate, ineffective, and overextended after such aggressive encounters is a crucial reason why care mandates are terminated and clients are referred to child and adolescent psychiatric care. With some 80% of clients in youth residential care suffering from traumatic life experiences and neglect, along with clinically relevant developmental, behavioral, or emotional concerns, exposure to client aggression will remain an occupational hazard (Burns et al., 2004; Collin-Vézina et al., 2011; Kisiel et al., 2014; Schmid et al., 2013; Teicher and Samson, 2016).

Researchers surveying populations of social service and psychiatric care providers (e.g. nurses, psychologists, or social workers) report especially high prevalence of verbal and physical aggression, with as many as 50–92% suffering verbal abuse, 39–68% being threatened, and 23–70% experiencing physical attacks (Alink et al., 2014; Enosh and Tzafrir, 2015; Franz et al., 2010; Gerberich et al., 2004; Hanson et al., 2015; Jayaratne et al., 2004; Koritsas et al., 2008; Ringstad, 2005). According to Alink et al. (2014), 81% of youth residential care staff experience client aggression, and about half of employees report the

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experience of physical aggression within a year. In a similar population, Steinlin et al. (2015b) found that among 319 employees, 91% experi- enced at least one, and 45% experienced three or more types of verbal or physical aggression in the three months prior to questioning.

Individuals are increasingly vulnerable to negative health outcomes when exposed to the cumulative effects of multiple stressors (Huxley et al., 2005; Littlechild, 2005; Richter and Whittington, 2006). Higher frequencies of aggressive encounters at work coincide with increased emotional exhaustion (Hogh et al., 2005; Winstanley and Hales, 2014). In a sample of UK social care staff, Harris and Leather (2011) found that increased exposure to service user violence lead to anxiety and vul- nerability. Symptoms of burnout, characterized by feelings of dis- empowerment, emotional exhaustion, cynicism, depersonalization, anxiety, and loss of confidence, are also common (Berger et al., 2012; Franz et al., 2010; Hanson et al., 2015; Steinlin et al., 2015a).

Individual factors such as sex, younger age, shift work and being single have also been linked to increased burnout risk (Dall'Ora et al., 2015; Lizano and Barak, 2012; Maslach et al., 2001; Wisetborisut et al., 2014). Johnson et al. (2016) found that mental health professionals reporting more of a perceived impact of boundary violations, reported higher emotional exhaustion and depersonalization. This was especially the case for younger professionals. Only a few studies address the re- lation between private stress and burnout, with inconsistent findings (Hakanen and Arnold, 2017). A study by Burisch (2002) did not support the association, while others found that negative life events and work- nonwork conflicts were positively associated with burnout (Dyrbye et al., 2006; Plieger et al., 2015; Reichl et al., 2014).

A relatively new and efficient method to determine long-term stress reactions is the assessment of cortisol secretion in hair (Stalder et al., 2014). As a part of the hypothalamus-pituitary-adrenal (HPA) axis, cortisol affects and enables effective coping with stressors by regulating basal processes such as fat and glucose metabolism, blood pressure, and inflammatory and immune responses (De Kloet et al., 2005; Miller et al., 2007; Stalder et al., 2014; Staufenbiel et al., 2013). However, cumulative, severe or chronic exposure can lead to dysregulation of the HPA axis, and over- as well as underproduction of cortisol are asso- ciated with a range of maladaptive effects (review: Guilliams and Edwards, 2010; Stalder et al., 2017; Staufenbiel et al., 2013). Initial studies found changes in hair cortisol concentrations (HCC) in adults with high levels of chronic stress, trauma, shift work, burnout, un- employment, and somatic illnesses (Penz et al., 2018; Staufenbiel et al., 2013; Wester and van Rossum, 2015; Vives et al., 2015).

Understanding the association between client aggression and an employee′s psychophysiological and emotional stress response is re- levant for youth welfare organizations, clinical inpatient facilities in child and adolescent psychiatry, as well as the children and adolescents in their care. Exposure to client aggression may interfere with inter- personal interactions between caregiver and client, directly reducing quality of care (Schmid et al., 2015; de Schipper et al., 2009; Holmqvist and Jeanneau, 2006; Maslach et al., 2001; Poghosyan et al., 2010). Implications for job performance, organizational commitment and job dissatisfaction, healthcare costs, and staff turnover could be consider- able (Schmid et al., 2015; Hanson et al., 2015; Aarons et al., 2010; Kim and Stoner, 2008; Richter and Berger, 2009). Despite the potential consequences for this highly vulnerable subgroup of children and adolescents and their caregivers, the long-term impact of client ag- gression on the chronic psychophysiological and emotional stress re- sponse has remained neglected in the domain of youth residential and/ or inpatient care.

In this exploratory study, we aimed to investigate the association between exposure to verbal and physical client aggression and the risk of developing high HCC as an indicator of chronic stress exposure and burnout in a Swiss population of professional caregivers working in youth residential care.

2. Method

We conducted this study as part of a larger government-funded model project examining the efficacy of trauma-informed care in re- sidential youth welfare institutions in the German speaking part of Switzerland. These institutions accommodate children, adolescents, and young adults between 7 and 25 years of age, over a third of whom have a criminal record or exhibit severely disruptive social behavior. About 80% of the patients report traumatic experiences, and the majority of them show clinically relevant internalizing and/or externalizing beha- vior (Schmid et al., 2017).

2.1. Study population

A total of 164 employees were enrolled in the study, but 43 of them were excluded due to missing data (response rate = 79.2%). Reasons for missing data included not filling out questionnaires correctly, not returning questionnaires/getting lost in the mail, refusing to provide hair samples or the hair being too short (under 3 cm). While a pro- portion of missing data is missing at random (21.9%), 79.1% were dependent on hair length and refusal to participate in the hair analyses (64.7% men). Excluded participants were more often men ($X^2 = 3.84$, df = 1, p = .05) and older (mean = 34.3 vs. 38.8 years old; t = −2.10; df = 162; p = .038), but showed no differences in other socio- demographic variables.

121 caregivers (46 men, 75 women) aged between 23 and 61 years who worked in 14 residential youth welfare institutions approved by the Swiss Federal Office of Justice participated in the study. Overall, 83.5% of participants were qualified or in-training social education workers. On average, they had 8.3 years (range = 1–37) of professional experience in residential youth welfare institutions and had worked in the present institution for a mean of 3.7 years (range = 0–18). Two years of professional experience and a working history in the present institution of one year were most frequently reported.

All participants were thoroughly informed about the study, and they gave written informed consent. The leading ethics committee of Basel, as well as the ethics committees of the cantons Bern, St. Gallen, Aarau, and Zürich approved this model project.

2.2. Procedures

We used a longitudinal design to estimate changes in HCC and re- ported burnout of youth residential care staff over time. Since some professional caregivers in our study reporting verbal aggression were additionally victims of physical aggression, participants were categor- ized into one of three groups at each sampling point, i.e., those re- porting no aggression ('no aggression' group), verbal threats ('verbal' group), or verbal threats and physical aggression ('verbal + physical' group). Data were collected from each institution at four annual sam- pling points. The initial measure included all participants in partaking institutions and then three more annual measures at regular intervals. Participants were continuously included in the study, with an average of 10.5 months between individual measurements. Thus, not all parti- cipants have data for all four measures, since some started working in the institutions during the course of the study or missed a data collec- tion due to absences (e.g. vacation, illness). Data were collected from surveys on sociodemographic variables and experiences of aggression at the workplace, a well-established burnout questionnaire, and cortisol analysis of hair samples.

2.3. Measures

2.3.1. Survey about private stressors (Fischer et al., 2012)

This survey documented the presence of typical private stressors for adults. The participants answered "yes" or "no" from a list of specific private stressors experienced in the last three months prior to

questioning (e.g. divorce, severe accident or physical illness, moving, death of a loved one, newborn, etc.), including an open question to give participants the opportunity to address further stressors. Due to the confounding potential on work-related stress (Dyrbye et al., 2006; Plieger et al., 2015; Reichl et al., 2014), the sum total of the reported private stressors was controlled for during the statistical analyses.

2.3.2. Survey about personal boundary violations at the workplace (Fischer et al., 2012)

This survey documented the caregivers′ exposure to aggression (1) by children and adolescents, (2) aggression among children and ado- lescents themselves, and (3) self-injuring or suicidal behavior of chil- dren and adolescents during the past three months (see Steinlin et al., 2015b). In this report, we only considered the items in connection with the caregivers′ exposure to aggression by children and adolescents. The participants were asked to report any experience of verbal threats and various types of physical aggression (e.g. getting bitten or pelted with objects) by their clients using a survey similar to that used in previous studies of workplace aggression (Alink et al., 2014; Gerberich et al., 2004; Hanson et al., 2015; Koritsas et al., 2008; Ringstad, 2005).

2.3.3. Burnout screening scales (BOSS; Hagemann and Geuenich, 2009)

The BOSS is a standardized and validated questionnaire to collect information on current psychological (cognitive and emotional), so- matic, and psychosocial symptoms in work-related, personal, and in- terpersonal domains which are related to burnout. The validity of this measure was established in large samples (Scholz et al., 2016; Wild et al., 2014). The first part of the questionnaire collects symptoms with regards to different life domains (work, personal life, family and friends) during the last three weeks (four scales with 30 items). The second part of the questionnaire collects data on clinical (somatic, cognitive, and emotional) symptoms during the last seven days (three scales with 30 items). According to Hagemann and Geuenich (2009) burnout is suspected if the total T-score on the 10-item work scale is elevated (T-score ≥ 60). The authors reported Cronbach′s alpha be- tween 0.75 and 0.91.

2.3.4. Hair cortisol analysis

Hair was collected from the posterior vertex region (Wennig, 2000). Strands of hair (1.5 cm long) adjacent to the scalp were analyzed. Given an average hair growth rate of 1 cm/month (Gao et al., 2013), the examination of a 1.5 cm hair segment allowed the assessment of cu- mulative cortisol secretion over the previous six weeks. Hair cortisol was extracted in line with the protocol reported by Gao et al. (2013).

Cortisol levels were determined using a commercially available high-sensitivity (analytical sensitivity 0.007 μg/dL) cortisol enzyme im- munoassay kit (Salimetrics Europe, UK) according to the manu- facturer′s protocol. The intra-assay and inter-assay coefficients of var- iation of this assay are below 9%. Samples were analyzed in duplicate, and mean values of respective measurements were calculated and used in statistical analyses. All measures were done in blinded fashion. As there are currently no validated cut-offs, HCC values were dichot- omized by way of sex-specific median-splits to account for confounding influences (Dettenborn et al., 2012; Stalder et al., 2017), creating two groups: "high HCC" vs. "low HCC". An increase in HCC was coded when increasing to above the sex-specific median. Values are expressed as pg cortisol/mg hair.

2.4. Statistical methods

We performed descriptive analyses for all included participants. Since sociodemographic data were not normally distributed, we re- ported median and interquartile ranges for continuous variables, and absolute numbers and percentages for discrete variables. Sociodemographic data of the groups named 'no aggression', 'verbal' aggression, and 'verbal + physical' aggression were compared with Pearson's chi-square and Kruskal-Wallis tests.

To identify between-group differences at study entry regarding in- itial HCC as well as psychological and somatic symptoms in different life domains, we calculated Pearson's chi-square for discrete variables, and depending on the data distribution either Kruskal-Wallis test or one-way analysis of variance (ANOVA) for continuous variables. Median/range, mean/standard deviation, or absolute numbers/per- centages were reported.

We calculated Cox proportional hazards regression based on 1000 bootstrap samples to compute hazard ratios (HR) and 95% CIs for the association between verbal and physical aggression and risk of high HCC or developing burnout during the course of the study. The Cox proportional hazards regression is sensible for analyzing continuous- time event occurrence data (Singer and Willett, 2003). It allowed us to examine and compare estimates for time-varying predictors, while also taking individual temporal modeling and differing number of mea- surement occasions across participants into account. The Cox model time scale represented the time in months from the initial measurement point until HCC increased to above the sex-specific median, or when onset of burnout was reported or the study ended, whichever occurred first. Sex, age, work experience in youth residential care, employment years in the current institution, and number of reported private stres- sors were included in the model.

Statistical analyses were conducted using IBM SPSS (version 23). All analyses were 2-sided with the alpha level set at 0.05.

3. Results

3.1. Descriptive analysis

Sociodemographic data as well as the number of reported private stressors were analyzed for all participants and compared between the 'no aggression', 'verbal' aggression, and 'verbal + physical' aggression groups. There were no significant sociodemographic differ

Table 1
Descriptive statistics at study entry for the study population of professional caregivers working in youth residential care in German-speaking Switzerland.

	No aggression (n = 55) n (%)	Verbal aggression (n = 46) n (%)	Verbal + physical aggression (n = 20) n (%)	value [a,b]	sig.
Sex (Female)	36 (65.5%)	27 (58.7%)	12 (60.0%)	0.53	0.769
Stable relationship	40 (85.1%)	34 (75.6%)	13 (65.0%)	2.58	0.275
Own children	23 (41.8%)	13 (28.3%)	9 (45.0%)	2.60	0.273
Shift work	25 (45.5%)	28 (60.9%)	15 (75.0%)	2.39	0.302
Age	med (range) 39.0 (23–57)	med (range) 31.0 (23–50)	med (range) 32.0 (23–61)	3.86	0.145
Current employm. (yrs)	3.0 (0–18)	1.5 (0.2–10)	2.5 (0.5–11)	3.39	0.183
Work experience (yrs)	5.0 (1–37)	5.0 (1–21)	6.0 (1.20)	1.64	0.441
Private stressors	1 (0–5)	1 (0–8)	2 (0–6)	4.80	0.091

[a] Pearson chi-square for comparison of discrete variables. [b] Kruskal-Wallis test for comparison of continuous variables

Table 2
Comparing average sex-specific hair cortisol concentration (HCC) and proportion with high HCC between aggression groups at study entry.

	No aggression (n = 55)	Verbal aggression (n = 46)	Verbal + physical aggression (n = 20)	value [a,b]	sig.
HCC					
Women median (range)	4.86 (1.45–10.55)	4.56 (2.25–15.57)	6.89 (1.44–11.57)	4.47	0.107
Men median (range)	5.02 (2.25–10.37)	5.52 (2.59–11.85)	7.76 (1.15–18.27)	3.35	0.188
High HCC (%)[c]	34 (45.8%)	26 (44.9%)	19 (81.0%)	8.92	.012*

[a] Pearson chi-square for comparison of discrete variables.
[b] Kruskal-Wallis test for comparison of continuous variables.
[c] High HCC = above the sex-specific median; cut-off women = 4.79 pg/mg cortisol; cut-off men = 5.37 pg/mg cortisol.
* $p < 0.05$.

between the three groups, as assessed with Pearson's chi-square for discrete variables and Kruskal-Wallis test for continuous variables (see Table 1).

3.2. Baseline hair cortisol concentrations in men and women

Average HCC in men and women reporting either 'no aggression', 'verbal' aggression, or 'verbal + physical' aggression at study entry were compared (see Table 2). Average HCC was comparable between groups in both men and women; however, almost twice as many par- ticipants in the 'verbal + physical' group were above the median cut-off compared to those in the 'no aggression' or 'verbal' aggression groups.

3.3. Initial psychological and somatic symptoms in different domains

Average psychological and somatic symptoms in work-related, personal, and interpersonal domains in participants reporting either 'no aggression', 'verbal' aggression, or 'verbal and + physical' aggression at study entry were analyzed (see Table 3). Somatic and emotional symptoms were comparable between the three groups. The initial se- verity of cognitive symptoms (e.g. "I have difficulties concentrating", "I react instead of act", "I often perceive things negatively") was sig- nificantly higher in the 'verbal + physical' aggression group. Although there was no difference in burden pertaining to work-related and per- sonal domains, the 'verbal + physical' aggression group also reported more burden in the interpersonal domains (e.g. "I take less part in my family's or partner's life", "my friends are worried about me", "I often retreat from social interactions"). The proportion of participants with suspected burnout was comparable between groups.

Table 3
Psychological (cognitive and emotional) and somatic symptoms in work-re- lated, personal, and interpersonal domains, and proportion of subjects with suspected burnout at study entry.

	No aggression (n = 55)	Verbal aggression (n = 46)	Verbal + physical aggression (n=20)	value [a,b]	sig.
	mean (SD)	mean (SD)	mean (SD)		
Domains					
Work-related	46.3 (6.2)	46.8 (7.5)	46.8 (7.0)	0.89	0.915
Personal	46.0 (6.9)	47.2 (6.3)	48.6 (5.5)	1.26	0.287
Family	47.6 (6.8)	48.4 (5.9)	51.8 (6.5)	3.23	.043*
Friends	47.6 (6.8)	48.5 (6.7)	51.8 (6.5)	2.87	0.061
Symptoms					
Somatic	49.0 (6.2)	50.7 (7.1)	50.0 (6.5)	0.91	0.404
Emotional	45.8 (7.2)	46.1 (7.3)	48.9 (4.8)	1.49	0.229
Cognitive	46.9 (5.5)	48.2 (5.5)	50.9 (5.9)	3.77	.026*
	n (%)	n (%)	n (%)		
At-risk for burnout	9 (16.4%)	9 (19.6%)	3 (15.0%)	0.22	0.894

[a] Pearson chi-square for comparison of discrete variables.
[b] One-way analysis of variance for comparison of continuous variables.
* $p < 0.05$.

3.4. Relative emotional and psychophysiological health risk

To calculate if the risk for high HCC and burnout is dependent on experiences of client aggression, two independent Cox regression models were used. The models included reported aggression as a pre- dictor variable, whereby 'no aggression' was the reference category. The models were additionally adjusted for age, sex, years working in youth residential care (i.e. work experience), employment years in current institution, and reported private stressors (see Table 4). The experience of 'verbal' aggression was not associated with an increased HCC, however, 'verbal + physical' aggression was associated with a 58% increase in the risk for high HCC compared to 'no aggression' during the study period. Experiencing either 'verbal' or 'verbal + phy- sical' aggression was associated with a 67% and 140% increase in the burnout risk compared to reporting 'no aggression' during the study period, respectively. Sociodemographic variables were not associated with increased HCC, but younger age or a prolonged career in youth residential care were associated with burnout risk.

4. Discussion

In this exploratory study, we investigated the association between exposure to verbal and physical client aggression and the risk of de- veloping high HCC as an indicator of chronic stress exposure and burnout in a Swiss population of professional caregivers working in youth residential care. To our knowledge, this is the first longitudinal

Table 4
Association between client aggression and the risk of high hair cortisol con- centration (HCC) and burnout during the course of the study, adjusted for age, sex, work experience, employment time in current institution, and reported private stressors.

	High HCC			Burnout		
	HR	95% CI	p [a]	HR	95% CI	p [a]
Client aggression						
No aggression	–			–		
Verbal aggression	1.25	(0.93–1.69)	0.114	1.67	(1.09–2.58)	.028*
Verbal + physical aggression	1.58	(1.07–2.36)	.022*	2.40	(1.35–4.25)	.004**
Age	0.99	(0.97–1.01)	0.318	0.95	(0.92–0.99)	.011*
Sex	1.04	(0.77–1.40)	0.772	1.04	(0.67–1.62)	0.860
Work experience (years)	1.02	(0.99–1.05)	0.190	1.08	(1.03–1.13)	.001**
Employment in current institution (years)	0.96	(0.91–1.01)	0.111	0.95	(0.89–1.02)	0.164
Private stressors	1.04	(0.94–1.15)	0.414	0.99	(0.85–1.16)	0.889

HR = Hazard ratios; CI = confidence intervals.
[a] Bootstrap results based on 1000 bootstrap samples.
* $p < 0.05$.
** $p < 0.01$.

study of the association between client aggression, psychophysiological stress, and emotional wellbeing in the setting of youth residential care. Client aggression has been found to coincide with increased psychophysiological stress and impaired emotional wellbeing (Franz et al., 2010; Gerberich et al., 2004; Hanson et al., 2015; Hogh et al., 2005; Winstanley and Hales, 2014). We found professional caregivers reporting verbal and physical aggression to have higher HCC, more cognitive symptoms, and greater burden in interpersonal domains.

Exposure to verbal aggression increased the risk of developing burnout symptoms (e.g. emotional exhaustion, cynicism, depersonalization, anxiety, and loss of confidence). Adverse work effects, such as modified work, quitting work or transferring, have been reported to be even greater for caregivers experiencing nonphysical violence than those suffering physical assault (Gerberich et al., 2004). Hanson et al. (2015) suggested that the pervasive nature of such aggression in many institutions and inpatient psychiatric facilities leads to an emotional wearing down that should not be disregarded.

In addition to burnout, the risk of high HCC was increased in caregivers exposed to combined verbal and physical aggression. In its severity, the accumulation of physical and verbal aggression may trigger more underlying anxiety and tension than verbal aggression alone, leading to the chronic activation of baser coping mechanisms involved in the body's stress response (Guilliams and Edwards, 2010; Harris and Leather, 2011; Stalder et al., 2014, 2017). The range of mental and physical health problems associated with changes in cortisol levels makes this an issue for concern (Penz et al., 2018; Staufenbiel et al., 2013; Vives et al., 2015; Wester and van Rossum, 2015).

Contrary to previous findings (Alink et al., 2014; Jayaratne et al., 2004; Johnson et al., 2016; Koritsas et al., 2008; Ringstad, 2005), our results did not indicate any effects of age and sex on the response to verbal and physical aggression, however being younger or having a longer professional career in youth residential care were both associated with greater burnout risk. Transitioning from student life into professional life is a critical time, where young newcomers must acclimatize to unaccustomed pressures and confrontations. Younger individuals are also less conscious-minded of self-caring, a protective factor against burnout (Merluzzi et al., 2011; Schmid et al., 2017; Steinlin et al., 2017). Alternatively, having spent more time in the field may increase vulnerability in a specific subgroup of professional caregivers due to prolonged exposure to an aggressive work environment with little room for recovery.

Client aggression in inpatient facilities has become a more openly discussed topic, and there is increasing pressure on the legislation and institutional guidelines (e.g. National Institute for Health and Care or The American Psychiatric Association) to protect both employees and clients. Despite negative health outcomes and implications for job satisfaction, turnover, and quality of care (de Schipper et al., 2009; Holmqvist and Jeanneau, 2006; Richter and Berger, 2009; Schmid et al., 2015), the potential of implementing diagnostic instruments or psychophysiological measurements in individual risk assessment is often overlooked. In light of our exploratory findings, prevention and intervention standards may need to take not only physical, but also verbal aggression into account. Institutions might profit from investing in trauma-informed care concepts and in verbal and physical aggression de-escalation courses, in supervision, intervision, and mental hygiene of their staff.

The present study has certain limitations. As the data stem from an exploratory project, the sample size was relatively small, so generalizations should be made with caution. Larger samples are, however, rare in the scope of longitudinal studies with psychophysiological parameters, and to our knowledge this is the first study to implement such a design in youth residential care. HCC reflected the past six weeks, whereas the burnout scales were anchored either to the past three weeks or seven days, which has the potential to impact error in the hazard ratios. Moreover, because reports of aggression were based solely on self-reports, a certain report/recall bias should be considered. However, the advantage of this is that inter-individual differences in stress perception are taken into account. We have no information on other confounding factors such as diabetes, alcohol, BMI, or psychiatric diagnoses (Stalder et al., 2017), which would be necessary to confidently answer the question to what extent high HCC and burnout can be attributed to external factors. Due to the left and right censoring of data and considering that participants reporting both verbal and physical client aggression show higher burden at study entry, the question of cause and consequence remains unanswered in our analyses: are stressed caregivers more prone to client aggression, or does exposure to client aggression lead to stressed caregivers?

Future research with larger sample sizes and other populations (e.g. child and adolescent psychiatry) is needed, whereby both psychological and physiological stressors, resilience factors, as well as individual confounders should specifically be taken into account. An additional focus on subsamples or high-risk populations would benefit our understanding of underlying processes and presumably reciprocal interactions between client aggression, burnout, and psychophysiological stress reactions. Prevention and intervention strategies which ideally could attempt to mitigate the risks of excessive stress can only be improved if employee burden is more fully understood. Ultimately, such strategies should be adapted to what youth welfare and psychiatric care providers require for their daily interactions with children and adolescents.

Disclosure

The funding agency was not involved in the study design, data collection, analysis, interpretation of the data, or manuscript preparation. The authors report no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.psyneuen.2018.05.001.

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4.3 Does improving quality of life, psychopathological symptoms and perceived self-efficacy predict improved aggressive behavior of clients?

Research Article: Disrupting the disruption cycle - a longitudinal analysis of aggressive behavior trajectories, quality of life, psychopathology and self-efficacy in closed youth residential care

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Disrupting the disruption cycle – A longitudinal analysis of aggression trajectories, quality of life, psychopathology and self-efficacy in closed youth residential care

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ABSTRACT

Background: A substantial amount of youths living in youth residential care demonstrate clinical levels of aggression during the course of their placements, which poses a major risk to care continuity. Yet developmental trajectories of aggressive behavior can vary.
Objective: We investigated if changes in quality of life (QoL), psychopathological symptoms and perceived self-efficacy predict aggressive behavior trajectories in youths with clinical aggression levels living in closed youth residential care in Germany.
Method: Youths (n = 63; 76.2% female; ages 11–17, M = 14.4, SD = 1.30) answered well-established questionnaires at two data collection points (T1 and T2) over an average of 6.5 months. Professional caregivers rated youths' aggressiveness in the 'aggressive behavior' subscale of the Child Behavior Checklist (CBCL). Two trajectories were retrospectively identified for youths demonstrating aggressive behavior at or above the borderline clinical range – 'stable-high' trajectories with persevering aggressive behavior ratings (CBCL T $\geq$ 67 at T2) and 'improved' trajectories with improved aggressive behavior ratings (CBCL T $<$ 67 at T2). We conducted binary logistic regression analyses to calculate if changes in self-reported QoL, psychopathology and perceived self-efficacy might predict trajectories of aggressive behavior.
Results: Youths were more likely to belong to the 'improved' than 'stable-high' aggressive behavior trajectory if they reported greater QoL improvements in regards to relationship with peers ($B = 0.89$, SE = 0.45, p = 0.014) and managing school requirements ($B = 0.69$, SE = 0.69, p = 0.010), greater reductions in substance use ($B = -0.26$, SE = 0.16, p = 0.029) and suicide ideation ($B = -0.32$, SE = 0.17, p = 0.020), as well as improvements in perceived self-efficacy, dependent on initial aggression level ($B = 0.05$, SE = 0.03, p = 0.034). Those with 'improved' trajectories were also less likely to experience placement disruptions.
Conclusion: In light of our exploratory findings, incorporating various life domains into closed residential care plans, focusing on emotion regulation, substance use prevention, and providing an environment that encourages self-efficacy could reduce aggressive behavior and subsequent placement disruptions. Implications for youth welfare policy and future research are discussed.

1. Background

Average prevalence of youths in residential care demonstrating clinical levels of aggression over the course of their placement is esti- mated around 40–50%, with even higher estimates in closed, restrictive settings (see Dölitzsch et al., 2014; González-García, Bravo, Arruabarrena, Martín, Santos, & Del Valle, 2017; Jenkel & Schmid, 2018; Keil & Price, 2006; Schmid, Goldbeck, Nuetzel, & Fegert, 2008; Vanschoonlandt, Vanderfaeillie, Van Holen, De Maeyer, & Robberechts, 2013). Yet change trajectories of aggressive behavior vary (Attar-Schwartz, 2008, 2009; Hagaman, Trout, Chmelka, Thompson, & Reid, 2010; Proctor, Skriner, Roesch, & Litrownik, 2010; Tabone et al., 2011; Woodruff & Lee, 2011). This is of interest because aggressive behavior such as physical and verbal abuse, insults and threats pose a major risk to care continuity (Lee, Chmelka, & Thompson, 2010; Rock, Michelson, Thomson, & Day, 2013; van Rooij, Maaskant, Weijers, Weijers, &

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Hermanns, 2015; Schmid et al., 2014).

Frequent discontinued care and disrupted placements are detri- mental to healthy development and impair future partaking in society (Aarons et al., 2010; Pérez et al., 2011). Nevertheless, one out of every five residential care placements in Germany is disrupted within the first year (Statistisches Bundesamt, 2004, 2010). Terminations of place- ments most often occur when caregivers feel overwhelmed and ill- equipped to manage difficult interactions (Geoffrion & Ouellet, 2013; Kind, Eckert, Steinlin, Fegert, & Schmid, 2018; Schmid, Steinlin, & Fegert, 2015; Schmid & Kind, 2017; Winstanley & Hales, 2014) and the danger to others is deemed too high (Cooley, Farineau, & Mullis, 2015; Izmirian, Milette-Winfree, Jackson, & Mueller, 2018; Lewis, Dozier, Ackerman, & Sepulveda-Kozakowski, 2007). The relative risk for dis- ruptions is especially high when youths demonstrate limited pro-social emotions combined with high proactive aggression (Schmid et al., 2014). Breaking the cycle of aggression and ensuing disruptions by exploring factors associated with reducing aggressive behavior is of utmost importance.

From a broad theoretical perspective, the relation between risk and protective factors to change trajectories of aggressive behavior can be explained by life course perspective theories. Life course theories take a multifaceted approach to understanding health trajectories by considering the mental, physical and social health of individuals over time (e.g. Cullati, Burton-Jeangros, & Abel, 2018; Farrington, 2005; Laub & Sampson, 1993). In this respect, sociodemographic factors, life events, but also changes in current malleable outer and inner circumstances may be relevant for changes in aggressive behavior.

Sociodemographic factors such as sex and younger age, as well as adverse life events hold relevance for aggressive behavior (Attar-Schwartz, 2008; Cullerton-Sen et al., 2008; Kornbluh & Neal, 2016; Kotch et al., 2008; Moffitt, 2013; Newton, Litrownik, & Landsverk, 2000; Oosterman, Schuengel, Slot, Bullens, & Doreleijers, 2007; Schmid & Kölch, 2010; Shackman & Pollak, 2014; Teisl & Cicchetti, 2008; Yoon, 2018; Yoon, Kobulsky, Voith, Steigerwald, & Holmes, 2015). For example, boys and girls may demonstrate aggression in different ways (see Cullerton-Sen et al., 2008). Youths may also learn from prior ad- verse life events and try to avoid further victimization and exploitation using (maladaptive) strategies available to them in a self-protective response (Campos, Mumme, Kermoian, & Campos, 1994; Shackman & Pollak, 2014; Shields & Cichetti, 1998; Teisl & Cicchetti, 2008). Next to sociodemographic factors, improving the quality of everyday life, comorbid psychopathological symptoms and belief in one's own efficacy may also be relevant for the course of aggressive behavior.

Quality of life (QoL) is a broad ranging concept that encompasses an individual's multidimensional perception of and satisfaction with their emotional, physical and social life circumstances and functioning in various life domains (Mattejat et al., 1998; WHO, 1995). This is contextualized by their culture, values, goals, expectations, standards and concerns, and is affected by health, social relationships, as well as level of independence (WHO, 1995). Youths living in youth welfare institutions are often referred due to inadequate living circumstances with limited QoL. Findings suggest collaborations with school, parents and peer groups to be highly relevant for favorable developments (Gander et al., 2019). A study in youth residential care found increases in self-reported total, physical and psychological QoL scores to be associated with placement continuity (Nelson et al., 2014). Difficulties attending school has been identified as a predictor of less resilient trajectories (i.e. stable-high or increasing aggressiveness) and unfavorable long-term outcomes (Attar-Schwartz, Benbenishty, & Roziner, 2017; Erskine et al., 2016). Studies also report negative associations between QoL and a range of psychopathological symptoms (Büttner, Petermann, Petermann, & Rücker, 2015; Damnjanović et al., 2012; Gander et al., 2019).

Comorbid internalizing and externalizing psychopathological symptoms, i.e. emotional and behavioral problems, may thus also be relevant for the course of aggressive behavior (Dölitzsch et al., 2014; González-García et al., 2017; Keil & Price, 2006; Schmid et al., 2008; Vanschoonlandt et al., 2013). Villodas et al. (2015) found that unstable aggressive behavior trajectories were linked to poorer physical and behavioral well-being. Children exhibiting continuous behavior problems were also more likely to suffer from a mental disorder (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Bruskas, 2008; Stouthamer-Loeber, Wei, Loeber, & Masten, 2004), have internalizing problems (Fanti & Henrich, 2010) and partake in risky behavior such as substance use (Andrade et al., 2012; Colder et al., 2013, 2017; Yampolskaya, Chuang, & Walker, 2019). Next to difficulties in various life domains and psychopathological symptoms, it can also be relevant how such personal circumstances are perceived.

Self-efficacy beliefs may play a major role in mediating this association between such aversive outer and inner circumstances and the course of aggressive behavior. According to the social information-processing model, aggressive behavior is a result of maladaptive evaluations and interpretations of social information, whereby misperceived hostility and poor emotion regulation plays a significant role (Crick & Dodge, 1994; Dodge & Crick, 1990; Dodge, Pettit, Bates, & Valente, 1995; Dodge & Pettit, 2003; Teisl & Cicchetti, 2008). Positive self-perceptions and retaining a sense of control over one's life can impact such perceptions and reactions (Bandura, Freeman, & Lightsey, 1999; Bandura, 2001; Hamill, 2003; Kim & Cicchetti, 2003; Mesurado, Vidal, & Mestre, 2018; Valois, Zullig, & Revels, 2017). Youths with a greater degree of internal resources and self-efficacy beliefs could have more comprehensive coping mechanisms available to them, which increases their independence, as well as capacity to manage difficult circumstances and adverse emotions over the course of their lives (Saarni, 1999). Farrell, Henry, Schoeny, Bettencourt, and Tolan (2010) found a stable negative association between self-efficacy and aggression, especially in girls. Evidence suggests that adolescents with increased self-efficacy are also less likely to engage in risky, aggressive or delinquent behavior, suicide ideation and substance use (Hamill, 2003; Valois, Zullig, Kammermann, & Kershner, 2013; Valois, Zullig, & Hunter, 2015; Zullig, Teoli, & Valois, 2014). Considering such findings, perceived self-efficacy might facilitate coping with life difficulties or comorbid psychopathological symptoms, improving the course of aggressive behavior.

Bearing in mind the importance of stable and consistent care for youths most desperately in need of it, breaking the cycle of aggression and subsequent disruptions is highly relevant. Closed institutional measures are often not the first, but rather the very last in a long line of unsuccessful placements (Jenkel & Schmid, 2018). Considering life course perspectives, understanding the course of aggressive behavior and malleable outer and inner circumstances in such closed settings could open possibilities for earlier prevention and intervention strategies. In this longitudinal exploratory study, we aimed to investigate if trajectories of aggressive behavior are predicted by changes in QoL, psychopathological symptoms and perceived self-efficacy in a population of youths demonstrating clinical levels of aggression living in closed residential care in Germany.

2. Method

We conducted this pilot study as part of a larger research project collecting systemic and multi-perspective data with standardized measuring instruments of youths living in eight closed residential care institutions in Germany. The legal basis for closed care is based on Art. § 1631 in German civil law, regarding the deprivation of liberty in connection with out-of-home placement. Legal guardians can file a motion to the family court in case of endangerment to self or others inadequately manageable in an open setting. It is not a legal punishment but a voluntary educational measure. All institutions include internal schooling and psychotherapy with individual opening steps. Placements are planned as short-term measures between 3 and 18 months, with male, female or co-ed settings. Main focus lay on assessing

epidemiological data as well as developments in psychopathological symptoms and protective factors during placements.

2.1. Study population

A total of 230 youths participated in the research project, but 167 were excluded from the current analyses due to subclinical levels of aggressive behavior at baseline (n = 107, 46.5%) or missing data at T1 (n = 60, 26.1%; see Supplementary Material 1 for comparison between total population and subsample). Thus 63 youths (15 boys, 48 girls) aged 11–17 years old, living in closed youth residential care and demonstrating clinical aggression levels as rated by their professional caregivers, were included in the study. Completing the test battery was expected to take upward of 1–2 h per person, contingent on reading and language comprehension strength. Depending on the questionnaire, between 8 and 20% of included participants had missing self-report data at T2. Reasons for missing data may have included lacking motivation, instable mental state or sudden placement disruption. Youths with missing data were more often male ($X^2 = 11.03$, $p = 0.002$), younger (median = 15 vs. 14 year old; U = 217.5, $p = 0.033$) and with fewer previous placements, i.e. less experience in institutional care (median = 3.5 vs. 1 previous placement; U = 197.0, $p = 0.027$).

2.2. Procedures

We used a repeated measures design to compare changes in QoL, psychopathological symptoms and perceived self-efficacy between aggressive behavior trajectories. Recruiting was continuous within the participating residential care institutions. The respective caregiving team was responsible for integrating the data collection and interpretation into the care plan as part of quality and development management. Youths and whenever possible, the same primary professional caregiver, answered well established self-report and informant report questionnaires upon study/ placement entry (T1) and study/ placement end (T2), with an average of 6.5 months between individual measurements. Professional caregivers rated youths' aggressiveness in the 'aggressive behavior' subscale of the Child Behavior Checklist (CBCL). Two trajectories were retrospectively identified for youths – 'stable-high' trajectories with persevering aggression ratings and 'improved' trajectories with subclinical aggression ratings at T2. Data were collected in participating institutions with the computerized test battery EQUALS (see www.equals.ch). Professional caregivers provided information on placement history, sociodemographic variables and placement disruptions. Youths assessed their QoL, psychopathological symptoms and perceived self-efficacy. Caregiving teams were offered case conferences to improve care plans that incorporated collected psychometric data by the leading research psychologist. Youths received individual feedbacks to their results from their professional caregivers who were schooled in feedback practices. All participants and their custody holders provided written informed consent for the data collection with the EQUALS tool with a form approved by the ethics committees of Basel and Ulm.

2.3. Measures

The instruments selected are all well-established questionnaires in German-speaking countries, as well as institutional care, with standardizations for Swiss and German populations. Clinically relevant, yet feasible and economic implementations were possible due to their availability in the computerized test battery EQUALS.

2.3.1. Child behavior checklist (CBCL)

Based on the methodology of a similar study on behavior trajectories in Israeli residential care, professional caregivers informed on aggressiveness of youths with the CBCL - a well-established 120-item screening instrument assessing externalizing and internalizing problems over the last three months (Achenbach & Edelbrock, 1991; Attar-Schwartz et al., 2017; Heflinger, Simpkins, & Combs-Orme, 2000). Items are scored on a 3-point scale; 0 = not true, 1 = sometimes true, 2 = often true. The instrument includes three broadband scales (externalizing problems, internalizing problems and total problem score), as well as 8 subscales (anxious/depressed; social withdrawal; somatic complaints; social problems; thought problems; attention problems; rule-breaking behavior; aggressive behavior). The 'aggressive behavior' subscale includes items such as "*destroys things belonging to others*", "*gets in many fights*" and "*threatens other people*". Previous studies report Cronbach's alpha between 0.78 and 0.94 (e.g. Döpfner, Schmeck, Berner, Lehmkuhl, & Poustka, 1994; Döpfner, Berner, & Lehmkuhl, 1995). Youths were included in the current analysis when professional caregivers rated their aggressive behavior at T1 as at or above borderline clinical range (T-score $\geq$ 67 on the subscale "aggressive behavior"). Included youths were subsequently allocated to the 'stable-high' and 'improved' trajectories depending on whether the T-score in the subscale "aggressive behavior" remained above T = 67 or dropped into the normal range (T < 67) at T2.

The CBCL was developed empirically through item-level factor analysis where items were clustered together into factors (syndromes) that best represent major behavioral problem dimensions. It is not a diagnostic instrument, and correlations are reported with numerous DSM-IV-classified disorders. Cross-informant agreement with the parallel standardized Youth Self Report (YSR) are small to modest ranging from 0.17 to 0.56, whereby youths tend to under report externalizing behavior problems (Gearing et al., 2015; Rescorla et al., 2013; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). In our sample, we found no significant CBCL-YSR correlation in the 'aggressive behavior' subscale (r = 0.06, p = 0.648).

2.3.2. Inventory of life quality in children and adolescents (ILC)

QoL was assessed using the ILC, a time-saving instrument widely used for research and clinical routine assessment in the German-speaking parts of Europe (Mattejat & Remschmidt, 2006). The ILC consists of 15 items including a global QoL score, and single-item subscales for school performance, family, social integration, interest and hobbies, physical health and mental health (e.g. *"How are you managing school requirements?", "How do you get along with peers?"*). Each item is scored on a 5-point scale where 1 = very good and 5 = very bad. Previous studies report Cronbach's alpha between 0.55 and 0.72 (e.g. Gander et al., 2019; Mattejat & Remschmidt, 2006).

2.3.3. Massachusetts youth screening instrument-Version 2 (MAYSI-2)

The MAYSI-2 is a well-established tool widely implemented in German and Swiss youth residential care. It is a 52 yes/no item screening instrument where youths report the absence or presence of psychopathological symptoms and behaviors related to behavioral, emotional and psychological difficulties within the past few months (Grisso & Barnum, 2006). Items produce scores on six clinical scales: angry-irritable (e.g. "*Are you often frustrated?", "When you get angry, do you stay angry for a long time?"),* depressed-anxious (e.g. "*Do youfeel lonely most of the time?", "Do you have nightmares?"),* somatic complaints (e.g. "*Do you get strong headaches?"),* suicide ideation (e.g. "*Have you wanted to take your own life?*"), and thought disturbance (for boys only; e.g. "*Do you hear voices that others couldn't hear?")* and one nonclinical scale (traumatic experiences, e.g. "*Have you ever been severely injured or in danger of being injured or killed?*") that screens for reported exposure to potentially traumatic experiences. Thought disturbance and traumatic experiences were not included in the current analysis. Authors of the MAYSI-2 report Cronbach's alpha between 0.73 and 0.89 (Grisso & Barnum, 2006).

2.3.4. Perceived self-efficacy (SWE)

The perceived self-efficacy of youths was assessed with a questionnaire that is well-established in Germany and Switzerland. Ten items are scored on a 4-point scale where 1 = disagree and

4 = completely agree (e.g. "*I always find solutions to my problems if I set my mind to it*", "*Even in unexpected circumstances I believe that I will manage*", Jerusalem & Schwarzer, 1999). The sum of the scores on the 10 items is transformed into a T-score, where a greater value reflects higher perceived self-efficacy. Previous studies report Cronbach's alpha between 0.76 and 0.90 (Jerusalem & Schwarzer, 1999; Schwarzer, Mueller, & Greenglass, 1999).

2.4. Statistical methods

Before data analysis, all variables were assessed for normality, outliers and missing data. Despite equal variances and no extreme outliers, data in many variables was not normally distributed. Data transformations did not improve this. In consideration of the small sample size, non-normal distribution and partially skewed data we opted for replacing missings at T2 by the group mean instead of mul- tiple imputation or full information methods (Cohen & Cohen, 1983; for discussion see Acock, 2005; Van Buuren, 2018). Nonparametric and robust bootstrapping methods were chosen for all further analyses. First, we compared sociodemographic data, information on placement history, placement disruptions, adverse life experiences, and the initial score in the CBCL 'aggressive behavior' subscale at T1 between the 'improved' and 'stable-high' aggressive behavior trajectories with Pearson's chi-square and Mann-Whitney-U tests (see Table 1 and Fig. 1). We reported median and ranges for continuous variables, and absolute numbers and percentages for discrete variables. Second, in a cross-sectional predictor analysis, initial QoL, psychopathological symptoms and self-efficacy were compared between the 'stable-high' and 'improved' aggressive behavior trajectories at T1 with Mann-Whitney U-tests (see Supplementary Material 2 and 3). Third, to account for predictor change over time, the difference (Δ delta) between T1 and T2 values was calculated for each predictor. We calculated separate binary logistic regression models for each predictor with stepwise inclusion of the delta value and relevant sociodemographic covariables. The outcome was the aggressive behavior trajectory. If covariables did not contribute significantly to models in a first step, they were excluded from the final models in a second step (see Tables 2–4). Multiple comparisons were adjusted with the Benjamini-Hochberg (BH) false discovery rate (FDR) method (Benjamini & Hochberg, 1995). Variables are listed in rank order of p value significance and accepted as significant if lower than the calculated BH correction value. FDR was set at 0.1. Statistical analyses were conducted using IBM SPSS (version 25). All further analyses were 2-sided with the alpha level set at 0.05.

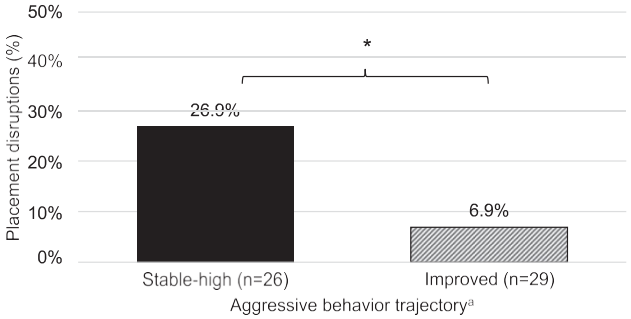

Fig. 1. Comparing placement disruptions between aggressive behavior trajectories in youths demonstrating clinical aggression levels living in closed youth residential care. [a]Pearson chi-square. 'Stable-high' = remaining at or above the borderline clinical range at T2 (T ≥ 67); 'Improved' = dropping into the normal range at T2 (T < 67). *p < 0.05.

Table 2
Predicting 'stable-high' and 'improved' aggressive behavior trajectories through changes in self-reported quality of life (QoL) with separate logistic regression models in youths demonstrating clinical aggression levels in closed residential care in Germany.

QoL Δ (n = 63)	*B*	SE	95% CI		*p*	*BH* [c]	*Sig.*
School requirements	0.69	0.35	0.16	1.50	0.010	0.009	**Sig.**
Peer relationship[b]	0.89	0.45	0.22	1.91	0.014	0.018	**Sig.**
Family relationship[b]	0.62	0.43	0.12	1.85	0.039	0.027	n.s.
School attendance	0.49	0.35	−0.10	1.28	0.048	0.036	n.s.
Interests and hobbies [b]	0.57	0.43	0.12	1.66	0.067	0.045	n.s.
Managing everyday life	0.68	0.48	−0.08	1.84	0.088	0.055	n.s.
Caregiver relationship	−0.37	0.39	−0.32	0.30	0.224	0.064	n.s.
Global QoL	0.21	0.31	−0.44	0.79	0.463	0.073	n.s.
Physical health	−0.17	0.45	−1.20	0.53	0.646	0.082	n.s.
Mental health	−0.07	0.29	−0.68	0.46	0.779	0.091	n.s.
Teacher relationship	−0.03	0.32	−0.71	0.59	0.940	0.100	n.s.

[a]Binary logistic regression analysis based on 1000 bootstrapped samples with stepwise inclusion of QoL deltas, initial aggression level and sex.
[b]Exclusion of sex due to lacking model relevance.
[c]Benjamini-Hochberg (BH) correction for multiple comparisons.
Δ (delta) = T2 – T1; SE = Standard Error; CI = Confidence Interval. 'Stable-high' = remaining at or above the borderline clinical range at T2 (T ≥ 67); 'Improved' = dropping into the normal range at T2 (T < 67).

Table 1
Descriptive statistics for the study population of youths demonstrating clinical levels of aggression with 'improved' and 'stable-high' aggressive behavior trajectories according to their professional caregivers in closed youth residential care in Germany.

	'Stable-high'(n = 31)	**'Improved'(n = 32)**		
	n (%)	n (%)	*Value*[a]	*p*
Sex (Female)	20 (64.5)	28 (87.5)	4.59	**0.032***
Migrant background	8 (25.8)	11 (34.4)	0.55	0.459
	Med (range)	Med (range)	*Value*[b]	*p*
Age	14 (11–17)	15 (12–16)	546.60	0.474
Time in instit. (months)	7.5 (3–24)	8 (0–27)	510.00	0.844
Time T1-T2 (months)	5 (1–22)	6 (2–26)	507.50	0.873
Previous placements	2 (0–5)	2 (0–9)	422.00	0.373
Adverse life events	6 (0–12)	7 (1–15)	532.00	0.139
Aggression at T1 (T-Score)	76 (67–91)	72 (68–86)	304.50	**0.008****

[a] Pearson's Chi-square.
[b] Mann-Whitney-*U* test.
Med = median. 'Stable-high' = remaining at or above the borderline clinical range at T2 (T ≥ 67); 'Improved' = dropping into the normal range at T2 (T < 67).
* p < 0.05.
** p < 0.01.

Table 3
Predicting 'stable-high' and 'improved' aggressive behavior trajectories through changes in self-reported psychopathological symptoms in the MAYSI-2 subscales with separate logistic regression models in youths demonstrating clinical aggression levels in closed residential care in Germany.

MAYSI-2 Δ (n = 63)	*B*[a]	SE	95% CI		*p*	*BH*[c]	*Sig.*
Suicide ideation[b]	−0.32	0.17	−0.73	−0.02	0.020	0.020	**Sig.**
Alcohol/drug use	−0.26	0.16	−0.63	−0.04	0.029	0.040	**Sig.**
Somatic complaints	−0.14	0.26	−0.75	0.27	0.499	0.060	n.s.
Angry-irritable	−0.06	0.11	−0.29	0.12	0.554	0.080	n.s.
Depressed-anxious	0.04	0.16	−0.29	0.38	0.797	0.100	n.s.

[a] Binary logistic regression analysis based on 1000 bootstrapped samples with stepwise inclusion of MAYSI-2 deltas, initial aggression level and sex.
[b] Exclusion of sex due to lacking model relevance.
[c] Benjamini-Hochberg (BH) correction for multiple comparisons.
Δ(delta) = T2 − T1; SE = Standard Error; CI = Confidence Interval. 'Stable-high' = remaining at or above the borderline clinical range at T2 (T ≥ 67); 'Improved' = dropping into the normal range at T2 (T < 67).

Table 4
Predicting 'stable-high' and 'improved' aggressive behavior trajectories through changes in self-reported perceived self-efficacy with a logistic regression model in youths demonstrating clinical aggression levels in closed residential care in Germany.

Perceived self-efficacy Δ (n = 63)	*B*[a]	SE	95% CI		*p*
Step 1					
Perceived self-efficacy	0.05	0.03	−0.01	0.11	**0.034***
Step 2					
Perceived self-efficacy	0.04	0.03	−0.01	0.12	0.078
Initial aggression level	−0.16	0.07	−0.33	−0.05	**0.005****
Sex	−1.52	2.92	−4.20	−0.10	**0.033***

[a] Binary logistic regression analysis based on 1000 bootstrapped samples with stepwise inclusion of perceived self-efficacy delta, initial aggression level and sex.
Δ(delta) = T2 − T1. SE = Standard error; CI = Confidence interval. 'Stable-high' = remaining at or above the borderline clinical range at T2 (T ≥ 67); 'Improved' = dropping into the normal range at T2 (T < 67).
* $p < 0.05$.
** $p < 0.01$.

3. Results

3.1. Descriptive analysis

3.1.1. Sociodemographic data

Sociodemographic data as well as the months living in the current institution, number of previous placements, the accumulation of adverse life events (e.g. child neglect, death of a primary caregiver, unemployment of a parent), and the initial score in the CBCL 'aggressive behavior' subscale at T1 were compared between the 'stable-high' and 'improved' aggressive behavior trajectories. The 'improved' behavior trajectories included a larger proportion of girls and lower initial aggressiveness scores than the 'stable-high' behavior trajectories. There were no group differences in other sociodemographic data as assessed with Pearson's chi-square for discrete variables and Mann-Whitney-*U* test for continuous variables (see Table 1).

For the total study population, the eight most frequent adverse life events reported by professional caregivers were sudden changes in care circumstances (58.7%), parental separation (57.1%), peer violence (41.3%), child neglect (38.1%), emotional abuse (34.9%), parental unemployment (30.2%), familial violence (27.0%), and mobbing at school (27.0%). There were no significant differences in reported adverse life events between the two trajectory groups, as assessed by Pearson's Chi-square test.

3.1.2. Placement disruptions

Over the course of the study, 55 youths left the current closed youth residential care institution. The proportion of placement disruptions reported by professional caregivers was compared between the 'stable-high' and 'improved' aggressive behavior trajectories. There was a significant association between trajectories and whether or not youths' placements were disrupted, $X^2(1) = 4.02$, $p = 0.045$ (see Fig. 1).

3.2. Quality of life

In a cross-sectional analysis, initial QoL in different domains were compared between the 'stable-high' and 'improved' aggressive behavior trajectories at T1. No significant differences were reported in any initial QoL domains (see Supplementary Material 2).

To assess if changes in QoL predict aggressive behavior trajectories, delta values for QoL domains were calculated between T1 and T2 and included as stepwise predictors with initial aggression level and sex in separate logistic regression models. Initial aggression level contributed significantly to all regression models. With increases in QoL delta regarding relationship to peers and managing school requirements, the likelihood of belonging to the 'improved' aggressive behavior trajectory increased significantly (see Table 2).

3.3. Psychopathological symptoms

In a cross-sectional analysis, self-reported psychopathological symptoms in the MAYSI-2 subscales were compared between the 'stable-high' and 'improved' aggressive behavior trajectories at T1. No significant differences were reported in any initial MAYSI-2 subscale (see Supplementary Material 3).

To assess if changes in psychopathological symptoms predict aggressive behavior trajectories, delta values for MAYSI-2 subscales were calculated between T1 and T2 and included as stepwise predictors with initial aggression level and sex in separate logistic regression models. Initial aggression level contributed significantly to all regression models. With decreases in MASYI-2 delta for reported suicide ideation and substance use the likelihood of belonging to the 'improved' aggressive behavior trajectory increased significantly (see Table 3).

3.4. Perceived self-efficacy

In a cross-sectional analysis, initial perceived self-efficacy was compared between the 'stable-high' and 'improved' aggressive behavior trajectories at T1. No significant difference was reported in initial perceived self-efficacy ('Stable-high': med = 46, range = 31–64; 'Improved': med = 45, range 20–66; U = 436.00, p = 0408).

To assess if changes in perceived self-efficacy predicts aggressive behavior trajectories, the delta value for changes in perceived self-efficacy was calculated between T1 and T2 and included as a stepwise predictor with initial aggression level and sex in a logistic regression model. Both co-variables contributed significantly to the regression model. With increases in perceived self-efficacy the likelihood of belonging to the 'improved' aggressive behavior trajectory increased significantly. This effect was hidden when incorporating co-variables into the model (see Table 4).

4. Discussion

In this exploratory pilot study, we aimed to investigate if different trajectories of aggressive behavior are predicted by changes in QoL, psychopathological symptoms and perceived self-efficacy in a population of youths demonstrating clinical aggression levels living in closed residential care in Germany. We additionally compared placement history, placement disruptions and adverse life events. To our knowledge, this is the first longitudinal study assessing aggressive behavior trajectories in the specific setting of closed youth residential care.

Professional caregivers reported that adolescents had experienced an average of six to seven adverse life experiences, including sudden changes in care circumstances, parental separation and unemployment, peer and family violence, emotional abuse, and mobbing at school. Adverse life events and frequent placement disruptions have been linked to aggression by a broad range of literature (Attar-Schwartz, 2008; Cullerton-Sen et al., 2008; Kornbluh & Neal, 2016; Kotch et al., 2008; Moffitt, 2013; Newton et al., 2000 Oosterman et al., 2007; Shackman & Pollak, 2014; Schmid & Kölch, 2010; Teisl & Cicchetti, 2008; Yoon et al., 2015). We found no difference in amount or types of adverse life events, or in amount of prior placements between youths with 'improved' or 'stable-high' aggressive behavior trajectories. In line with life course perspectives, this may suggest that the course of ag- gressive behavior is not irrevocably predetermined by biographical circumstance and can be affected by later changes in outer and inner circumstances.

Youths with 'stable-high' aggressive behavior trajectories were more likely to experience a placement disruption from the current institution than those with 'improved' trajectories. This may be explained by the tendency of professional caregivers to feel overwhelmed and ill-equipped to manage difficult and aggressive interactions. They worry about protecting other vulnerable clients in their care, withdraw emotionally, feel less self-efficacious, and experience little outer and inner security, ultimately leading to care terminations (Cooley, Farineau, et al., 2015; Izmirian et al., 2018; Kind et al., 2018; Lewis et al., 2007; Schmid & Kind, 2017; Winstanley & Hales, 2014). Frequent disruptions in youths with aggressive behavioral may further be explained by co-morbid attachment difficulties and symptoms of complex traumatization, which exacerbate forming stable relationships (Dölitzsch et al., 2014; González-García et al., 2017; Keil & Price, 2006; Schmid et al., 2008; Vanschoonlandt et al., 2013).

Youths were more likely to belong to the 'improved' than 'stable-high' aggressive behavior trajectory if they reported greater improvements in the relationship to peers and managing school requirements. Improvements in both QoL domains may be linked to the development of numerous adolescent resources such as social competence, independence, self-confidence and self-regulation. This is in line with previous research that suggests that collaborations with schools, parents and peer groups are highly relevant for favorable developments (Büttner et al., 2015; Cooley, Wojciak, Farineau, & Mullis, 2015; Gander et al., 2019; Nelson et al., 2014; Yoon et al., 2015). Some authors also emphasize dropping out of school as an especially high-risk factor for an unfavorable prognosis (Attar-Schwartz et al., 2017; Erskine et al., 2016). Apart from incorporating the social network into the care plan, this may highlight improving school attendance and managing school requirements as an equally elevated priority.

Youths were more likely to belong to the 'improved' than 'stable-high' aggressive behavior trajectory if they reported greater reductions in substance use and suicide ideation. Previous research similarly reports associations between unstable aggressive behavior trajectories and partaking in risky behavior, including substance use (Andrade et al., 2012; Colder et al., 2013, 2017; Fanti & Henrich, 2010). Teisl and Cicchetti (2008) suggest that cognitive and emotional competence mediates the association between adverse emotionality and aggression. Substance use and suicide ideation could be understood as mediating (maladaptive) coping strategies that facilitate aggressive behavior. Focusing on the development of adaptive emotion regulation strategies and early substance use prevention could minimize aggressive behavior and support placement stability.

Lower initial aggression level increased the likelihood of belonging to the 'improved' aggressive behavior trajectory. It is well-documented that aggression severity coincides with prognosis (Lee et al., 2010; Rock et al., 2013; van Rooij et al., 2015; Schmid et al., 2014). Our findings suggest that unlike relationship quality to peers, managing school requirements, reduced substance use and improved suicide ideation, improvements in self-efficacy are not impartial to initial aggression severity.

Youths were more likely to belong to the 'improved' aggressive behavior trajectory if they reported greater increases in their perceived self-efficacy when disregarding initial aggressiveness. This partially supports previous findings that report developing self-efficacy beliefs to have a protective effect on aggressive behavior (Farrell et al., 2010, Valois et al., 2013; Zullig et al., 2014). Building on social information-processing theory, positive self-perceptions and retaining a sense of control over one's life, could play an important role in determining if an individual behaves aggressively (Bandura et al., 1999; Bandura, 2001; Crick & Dodge, 1994, Hamill, 2003; Kim & Cicchetti, 2003). Saarni (1999) argues that developing adaptive coping mechanisms and emotion regulation skills might strengthen self-efficacious beliefs - likely because effective coping heightens sense of achievement and leads to more positive social feedback. Developing perceived self-efficacy in youths with aggressive behavioral could be achieved by training emotion regulation, providing a sense of control despite the restricted setting (e.g. giving choices, behaving transparently, allowing participation in decision-making), celebrating progress and focusing on expanding resources and individual strengths. However, youths with lower clinical aggression levels might be most likely to benefit from any care interventions focused on improving self-efficacy.

As in previous studies, we found sex differences (Cullerton-Sen et al., 2008; Kornbluh & Neal, 2016; Yoon et al., 2015). First, our sample included more girls, which is uncommon in the care system. This may be attributed to a higher study compliance in girls, a selection bias caused by more participating institutions being for girls and that in the German care system boys might more readily get placed in juvenile justice centers, whereas girls get placed in closed civil institutions such as the ones included in this study. Second, girls were more likely to belong to the 'improved' aggressive behavior trajectory than boys. It could be that a larger proportion of girls demonstrated 'improved' trajectories because girls respond more strongly to interventions. Alternatively, Cullerton-Sen et al. (2008) report that boys and girls demonstrate aggression in different ways. It is possible that girls still demonstrate aggressive behavior, it however evolves into more covert forms of expression that are not screened for in the implemented CBCL subscale.

Along with numerous ILC domains, depressed-anxious symptoms and somatic complaints, changes in the MAYSI-2 'angry-irritable' subscale did not predict aggressive behavior trajectory. This could be explained by discrepancies in self and informant reports of aggression or because the 'angry-irritable' subscale might address emotionality while the CBCL subscale addresses behavior, i.e. just because someone feels angry or irritable does not mean they will act aggressively. The highly specialized setting of closed residential care could explain the lacking predictive ability of changes in numerous life domains. The restrictive environment with internal schooling, balanced meal plans, mandatory activities and extracurriculars with close supervision by professional caregivers may improve school attendance, relationships and health irrespective of aggressive behavior.

The present study has certain limitations. As the data stem from an exploratory project and only participants with clinical aggression levels were included, the sample size was fairly small. Generalizations should be made with caution when considering that studies in this specific and very vulnerable subgroup of residential care are still rare. Cross-sectional analyses show higher burden in our total sample than age- and gender-matched school and open residential care samples (Jenkel & Schmid, 2018). The time between T1 and T2 varied between individual measurements, which may affect the validity of results, however the variability did not differ between aggressive behavior trajectories. We expect a longer time interval to provide more opportunity for improvement, yet when considering that deprivation of liberty is only justifiable as long as an open setting is not, it may alternatively suggest that continued indication for a closed setting is given. Those with a shorter time interval may have profited more readily. Unfortunately,

we have no reliable information on reasons for missing data, psychiatric diagnoses, intelligence, current treatments (incl. medication) or aggression quality, which may be relevant for aggressive behavior trajectories. For example, low intelligence may be relevant for behavioral problems and evidence suggests that individuals with limited pro-social emotion and demonstrating proactive (vs. reactive) aggression are at greatest risk for care terminations (Helton, Vaughn, Kavish, & Boutwell, 2018; Schmid et al., 2014). The empirically derived cut-off score for aggressive behavior in the CBCL is not a direct reflection of a specific clinical diagnosis. The current study cannot confidently answer the question of what is cause and what is consequence: does aggressive behavior decrease because situational, physical and mental circumstances improve, or vice versa?

Future research with larger sample sizes is needed, whereby diagnoses, intelligence and aggression quality are taken into account. Predictors involved with changes or increases in aggressive behavior in subclinical samples could also be considered. Studies report that most placement disruptions occur within the first six months after arrival. It would be valuable to implement programs focusing on equipping professional caregivers with skills needed to endure more difficult clientele for longer periods of time, surpassing a bumpy start without burning out (e.g. Kind, Bürgin, Fegert, & Schmid, 2019; Schmid & Kind, 2017). With its focus on re-establishing inner and outer security, offering secure relationships, transparency, participation, and needs orientation, trauma-sensitive care could be an appropriate approach (Schmid & Fegert, 2015a; Schmid & Fegert, 2015b; Schmid & Lang, 2012).

Findings of this exploratory study suggest reducing youths' aggressive behavior in closed institutional care by taking an interdisciplinary approach to improving QoL that incorporates various life domains into the care plan. Adolescents are in the midst of developing their independence and identity. Focusing on emotion regulation, early substance use prevention, addressing suicide ideation and providing a safe environment that encourages self-efficacy beliefs during this crucial developmental phase could be beneficial to reduce aggressive behavior and subsequent placement disruptions.

CRediT authorship contribution statement

Nina Kind: Conceptualization, Methodology, Formal analysis, Writing - original draft. **David Bürgin:** Conceptualization, Methodology, Writing - review & editing. **Vera Clemens:** Writing - review & editing. **Nils Jenkel:** Conceptualization, Investigation, Project administration, Funding acquisition. **Marc Schmid:** Writing - review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.childyouth.2020.105015.

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4.4 Do sense of coherence, perceived self-efficacy and self-care practices protect against developing burnout in professional caregivers?

Research Article: What protects youth residential caregivers from burning out? A longitudinal analysis of individual resilience

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What Protects Youth Residential Caregivers from Burning Out? A Longitudinal Analysis of Individual Resilience

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Abstract: *Background*: Professional caregivers are exposed to multiple stressors and have high burnout rates; however, not all individuals are equally susceptible. We investigated the association between resilience and burnout in a Swiss population of professional caregivers working in youth residential care. *Methods*: Using a prospective longitudinal study design, participants (n = 159; 57.9% women) reported on burnout symptoms and sense of coherence (SOC), self-efficacy and self-care at four annual sampling points. The associations of individual resilience measures and sociodemographic variables, work-related and personal stressors, and burnout symptoms were assessed. Cox proportional hazards regressions were calculated to compute hazard ratios over the course of three years. *Results*: Higher SOC, self-efficacy and self-care were related to lower burnout symptoms in work-related and personal domains. Higher SOC and self-efficacy were reported by older caregivers and by those with children. All three resilience measures were highly correlated. A combined model analysis weakened the protective effect of self-efficacy, leaving only SOC and self-care negatively associated with burnout. *Conclusion*: This longitudinal analysis suggests that SOC and self-caring behaviour in particular protect against burnout. Our findings could have implications for promoting self-care practices, as well as cultivating a meaningful, comprehensible and manageable professional climate in all facets of institutional care.

Keywords: residential care; burnout; stress; resilience; sense of coherence; self-efficacy; self-care

1. Background

Professional caregivers working in youth residential care are exposed to multiple stressors and have high burnout rates [1–4]. A Swiss national survey found 80% of children and adolescents reporting traumatic experiences [5], and the majority show clinically relevant internalizing and/or externalizing behaviour [5–8]. This vulnerable clientele, often exhibiting severely disruptive social behaviour, are supervised by professional caregivers in physically and emotionally demanding shifts around the clock.

Burnout is characterized by feelings of disempowerment, emotional exhaustion, cynicism, depersonalization, anxiety and loss of confidence [2,3,9,10]. Studies estimating the prevalence of burnout have suggested that as many as 50% of child protection workers report burnout symptoms [10–12]. In their meta-analyses, Mor Barak et al. reported burnout as being one of five variables with the largest standardized effect size associated with turnover in social work [13]. When work demands become overwhelming, the risk of burning out increases, which poses a problem for work satisfaction, employee turnover and quality of care

[5,14–16]. In particular, the ineffective aspect of burnout has been largely disregarded in stress research [4]. However, not all individuals are equally susceptible to developing burnout symptoms.

Numerous studies have assessed individual resilience to such work-related stress, which the American Psychological Society defines as the process of 'bouncing back' and adapting in the face of difficult experiences [17,18]. One well-known measure of resilience is sense of coherence (SOC), established as an integral variable related to the professional functioning of an individual [19]. The term was coined by Aaron Antonovsky and reflects one's perception of life as being comprehensible, manageable and meaningful. Other resilience measures include self-caring behaviour (e.g., team supervision, work-life balance, physical health, social support) and perceived self-efficacy—a subjective belief in the ability to execute the actions required to manage situations [20–26].

Stress research supports an association between individual resilience measures and burnout [27–31]. In a study on Polish social workers, a higher SOC was related to fewer burnout symptoms [32]. In their cross-sectional study with 2053 Danish employees, Albertson et al. found that people with high levels of SOC experienced less stress symptoms [33]. Feldt found that they were also more protected from adverse psychological effects of stressful work conditions [34]. Perceived self-efficacy of staff had a positive influence on burnout symptoms [35–37]. A meta-analysis of 57 studies by Shoji et al. even demonstrated significant self-efficacy–burnout relationships across countries and professions, while workers who engaged in more self-care reported lower burnout levels [21,22,38]. Based on such findings, individual attitudes and behaviours may reduce the likelihood of feeling threatened by adverse work conditions or less vulnerable thereafter, and more readily able to cope with future stressors.

Sociodemographic factors such as sex, younger age, shift work and being single have also been linked to increased burnout risk [39–44]. Inversely, higher SOC scores and self-efficacy were found in older age cohorts, and in those with more work experience [24,38,45].

Investigating the buffering role of individual resilience on burnout is highly relevant for youth welfare organizations and occupational health policies. Despite the broad band of resilience and burnout research, as well as the implications for job performance, organizational commitment and job dissatisfaction, healthcare costs, and staff turnover, the long-term impact in the domain of youth residential care remains largely unexplored [3,5,46,47].

Drawing on the theoretical and empirical evidence, the main aim of this study was to investigate the longitudinal association between specific resilience measures and burnout in a Swiss population of professional caregivers working in youth residential care.

2. Methods and Measures

We conducted this prospective study as part of a larger government-funded model project examining the efficacy of trauma-informed care in residential youth welfare institutions in the German speaking part of Switzerland. Included welfare institutions were approved by the Swiss Federal Office of Justice and incorporate a broad range of clients placed in out-of-home care for both civil reasons (e.g., family conflicts, neglect) and juvenile justice reasons (e.g., educational measures, reintegration). Six institutions were sex-specific (3 for boys, 3 for girls, ages 12–20 years old), while eight institutions were co-educative (ages 5–20 years old). The 14 youth welfare institutions offer placements for almost 300 clients. Managers and employees were trained in specific care concepts, and caregiver burden, attitudes and resilience were assessed over the course of three years. Sample size estimations were originally based on the primary study aim. Due to the secondary, explorative nature of the current analyses, no sample estimation to determine response rate was conducted.

2.1. Study Population

A total of 168 employees were enrolled in the study, but 9 of them were excluded due to missing data in baseline variables. Thus, 159 professional caregivers, i.e., social pedagogues or social pedagogues in training (67 men, 92 women) aged between 22 and 61 years (mean = 35.85, SD = 9.68) who worked in 14 residential

youth welfare institutions were included in the study. On average, they had 8.3 years (range = 0–37) of professional experience in residential youth welfare institutions and had worked in the present institution for a mean of 3.9 years (range = 0–21). Two years of professional experience and a working history in the present institution of one year were most frequently reported.

2.2. Procedures

We used a longitudinal design over the course of three years to estimate changes in the reported burnout of youth residential care staff over time. Surveys and well-established questionnaires were mailed to partaking institutions at four annual sampling points between 2012 and 2015. Participants were continuously included in the study, with an average of 10.5 months between individual measurements. Not all participants had data for all four measures, since some started working in the institutions during the course of the study or missed a data collection due to absences (e.g., vacation, illness). Data were collected from surveys on sociodemographic variables, experiences of personal and work-related stressors, and self-caring behaviour, as well as questionnaires on burnout, SOC and perceived self-efficacy

2.3. Ethics Approval and Consent to Participate

All participants were thoroughly informed about the study, and they gave written informed consent. The leading Ethics Committee Basel-Stadt and Basel-Land (EKBB, Ref.Nr. 288/12), as well as the Cantonal Ethics Committee Bern (KEK-BE, Ref.Nr. 014/13), Ethics Committee St. Gallen (EKSG, Ref.Nr. 13/003), Ethics Committee Appenzell Ausserrhoden (EKAR, Ref.Nr. 34), Cantonal Ethics Committee Luzern (KEK-LU, Ref.Nr. 13009) and the Cantonal Ethics Committee Zürich (KEK-ZH, Ref.Nr. 2013-0030) approved this model project.

2.4. Measures

2.4.1. Burnout Screening Scale

The Burnout Screening Scale (BOSS) is a standardized and validated questionnaire to collect information on current psychological (cognitive and emotional), somatic, and psychosocial symptoms in work-related, personal, and interpersonal domains which are related to burnout [48]. The validity of this measure was established in large samples [49,50]. The first part of the questionnaire assesses symptoms in different life domains (work, personal life, family and friends) during the last three weeks (4 subscales with 30 items). The second part of the questionnaire assesses clinical (somatic, cognitive, and emotional) symptoms during the last seven days (3 subscales with 30 items). A 6-point Likert scale scored from 1 = "does not apply" to 6 = "applies strongly" is used. According to Hagemann and Geuenich, burnout is suspected if one or more values on the 10-item work scale are elevated (T-score ≥ 60). The authors reported Cronbach's alpha between 0.75 and 0.91.

2.4.2. Sense of Coherence Scale

The sense of coherence in regards to daily work was assessed with a well-established German short version of the Sense of Coherence Scale by Antonovsky and Franke (7-point Likert scale with 9 items, scored from 1 = "very often" to 7 = "very rarely/never"). A total score ranging from low to high levels of SOC was calculated [51,52]. The mean was reported in the analyses. The authors of the German version reported Cronbach's alpha of 0.87 [51].

2.4.3. Perceived Self Efficacy

The perceived self-efficacy of caregivers was assessed with a well-established questionnaire developed for teacher populations and slightly adapted by the authors for professional caregivers (4-point Likert scale

with 10 items, scored from 1 = "not true" to 4 = "exactly true") [53]. The meanwas reported in the analyses. The authors reported Cronbach's alphas between 0.71 and 0.92 [53].

2.4.4. Self-care Questionnaire

This author-developed questionnaire assessed physical, psychological and work-related self-caring behaviour [54]. The reference period reflected the past 3 months (4-point Likert scale with 24 items, scored from 1 = "completely inaccurate" to 4 = "completely accurate"). After conducting a principal components analysis to reduce data, three factors were extracted and rotated using promax-rotation (kappa = 4): (a) physical factors (e.g., participating in sports, sleeping enough, balancing nutrition), (b) psychological factors (e.g., feeling supported, upholding values, self-reflection) and (c) work-related factors (e.g., taking breaks, successfully transitioning from work to personal life, sharing responsibilities). In our sample, Cronbach's alpha was 0.84. The selectivity of the items ranged from 0.22 to 0.59, while item difficulty ranged from 0.56 to 0.93. The total score mean was calculated for further analyses.

2.4.5. Survey about Work-related and Personal Stressors

This author-developed survey documented the presence of work-related stressors in youth residential care, as well as typical personal stressors for adults [55]. Participants answered "yes" or "no" from a list of specific stressors experienced in the last three months prior to questioning. The 19 items on work-related stressors included exposure to aggression from clients (e.g., insults, kicked, spat on), aggression among children and adolescents (e.g., fighting) and self-injuring or suicidal behaviour of clients [10]. The 15 items on personal stressors documented life events such as divorce, severe accident or physical illness, moving, death of a loved one or birth of a child, including an open question to give participants the opportunity to address further stressors. Due to the confounding potential on burnout symptoms, the sum totals of reported work-related and personal stressors were controlled for during the statistical analyses [1,56–58].

2.5. Statistical Method

We explored associations between sociodemographic data and resilience measures by calculating analyses of variance (ANOVA) for categorical variables and Pearson's correlation for continuous variables. Since some authors have argued that resilience is a holistic tendency and not concept specific, we performed bivariate Pearson's correlation to test for associations between the SOC, self-efficacy and self-care constructs [22,59,60]. We calculated Pearson's correlations to test associations between burnout and resilience measures at study entry. We calculated logistic regression models to determine the odds of burnout at study entry in relation to SOC, self-efficacy and self-care in independent models and then in a combined model. Last, we calculated Cox proportional hazards regression models to test the longitudinal association between SOC, self-efficacy and self-care and the risk of developing burnout during the course of the study. The Cox proportional hazards regression is sensible for analysing continuous-time event occurrence data [61]. It allowed us to examine and compare estimates for time-varying predictors, while also taking individual temporal modelling and differing number of measurement occasions across participants into account. We calculated models for each predictor independently and then combined. The Cox model time scale represented the time in months from the initial measurement point until onset of burnout or the last measurement point at which no burnout was reported (censoring). All cox models initially included the covariates sex, age, work experience in youth residential care, and employment years in the current institution, but none of these variables were significant predictors of time to burnout and therefore subsequently dropped from the models. All logistic regression and cox models were based on 2000 bootstrap samples. Statistical analyses were conducted using IBM SPSS (version 25, SPSS Inc., Chicago, IL, USA). All analyses were two-sided with the alpha level set at 0.05.

3. Results

3.1. Sociodemographic Variables

Associations between sociodemographic variables, reported personal and work-related stressors and resilience measures were analysed for all included participants at study entry (Table 1). Male participants reported higher values in self-efficacy compared to female participants. Older participants and those with children reported higher SOC and self-efficacy scores. The number of work-related stressors was negatively associated with self-efficacy and self-care. Being in a stable relationship, employment years in the current institution, work experience and personal stressors were not related to any resilience measures.

Table 1. Cross-sectional analysis of sociodemographic variables and resilience measures at study entry for the study population of professional caregivers.

***N* = 159**	**Sense of Coherence**		**Self-efficacy**		**Self-care**	
	M (SD)	***p***	**M (SD)**	***p***	**M (SD)**	***p***
Sex [a]						
Male (*N* = 67)	5.76 (0.68)	0.048 *	3.17 (0.28)	0.013 *	3.25 (0.30)	0.156
Female (*N* = 92)	5.54 (0.73)		3.06 (0.29)		3.32 (0.31)	
Stable relationship [a]						
Yes (*N* = 115)	5.69 (0.71)	0.065	3.13 (0.28)	0.250	3.30 (0.31)	0.942
No (*N* = 33)	5.42 (0.69)		3.07 (0.32)		3.30 (0.29)	
Own children [a]						
Yes (*N* = 62)	5.81 (0.70)	0.013 *	3.20 (0.28)	<0.001 ***	3.28 (0.34)	0.625
No (*N* = 97)	5.52 (0.71)		3.04 (0.28)		3.30 (0.29)	
	r	*p*	r	*p*	r	*p*
Age [b]	0.21	0.006 *	0.23	0.005 **	−0.02	0.776
Current empl. (yrs) [c]	0.18	0.048 *	0.17	0.073	−0.12	0.212
Work exp. (yrs) [c]	0.11	0.218	0.14	0.099	−0.12	0.156
Work-related stressors [c]	−0.21	0.129	−0.16	0.042 *	−0.18	0.027 *
Personal stressors [c]	−0.14	0.087	−0.03	0.737	−0.32	0.687

M = Mean, SD = Standard deviation, r = correlation coefficient; [a] ANOVA; [b] Pearson's correlation; [c] Spearman's correlation; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

3.2. Bivariate Correlations between SOC, Self-efficacy and Self-care at Study Entry

Bivariate Pearson's correlations were conducted to analyse associations between the SOC, self-efficacy and self-care constructs at study entry. The three resilience measures were found to be highly correlated with each other (Table 2).

Table 2. Bivariate Pearson's correlations between sense of coherence, self-efficacy and self-care at study entry.

	Self-efficacy		**Self-care**	
	r	***p***	**r**	***p***
Sense of coherence	0.37	<0.001 ***	0.37	<0.001 ***
Self-efficacy	-		0.33	<0.001 ***

r = correlation coefficient; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

3.3. Association between Resilience Measures and Burnout at Study Entry

Pearson's correlation was analysed to test for associations between burnout symptoms in different life domains and resilience measures at study entry (Table 3). Difficulties in work-related, personal and interpersonal domains were negatively associated with SOC and self-care. Self-efficacy was only linked to difficulties in work-related and personal, but not interpersonal domains. Initial cognitive symptoms (e.g., "I have difficulties concentrating", "I often perceive things negatively") were negatively associated with SOC, self-efficacy and self-care, however somatic symptoms (e.g., "I have difficulty sleeping, "I suffer from

headaches") and emotional symptoms (e.g., "I feel anxious", "I am irritable and tense") were only associated with SOC and self-care.

Table 3. Associations between burnout symptoms in different life domains and sense of coherence, self-efficacy and self-care.

	Sense of coherence		Self-efficacy		Self-care	
	r	*p*	r	*p*	r	*p*
Domains						
Work-related	−0.48	<0.001 ***	−0.22	0.005 **	−0.55	<0.001 ***
Personal	−0.47	<0.001 ***	−0.18	0.025 *	−0.57	<0.001 ***
Family	−0.28	<0.001 ***	−0.01	0.994	−0.34	<0.001 ***
Friend	−0.28	<0.001 ***	−0.06	0.443	−0.44	<0.001 ***
Symptoms						
Somatic	−0.34	<0.001 ***	−0.13	0.122	−0.45	<0.001 ***
Emotional	−0.53	<0.001 ***	−0.15	0.067	−0.45	<0.001 ***
Cognitive	−0.49	<0.001 ***	−0.20	0.013*	−0.45	<0.001 ***

r = correlation coefficient; [a] Pearson's partial correlation coefficients controlled for age and sex; * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

At study entry, 31 participants were considered at-risk for burnout compared to 128 participants not at-risk. We calculated three logistic regression models to assess the cross-sectional association between SOC, self-efficacy, self-care and burnout. SOC (OR = 0.40, 95% CI [−1.46, −0.59], $p < 0.001$), self-efficacy (OR = 0.53, 95% CI [−1.12, −0.21], $p = 0.003$) and self-care (OR = 0.34, 95% CI [−1.76, −0.62], $p < 0.001$) were associated with burnout. Scoring one standard deviation above the mean in any resilience measure reduced the odds of being at risk for burnout at study entry.

In a second step, we calculated a combined model with all three predictors, which adjusted for associations between the resilience measures. Only SOC (OR = 0.50, 95% CI [−1.33, −0.26], $p = 0.004$) and self-care (OR = 0.42, 95% CI [−1.66, −0.30], $p = 0.001$) predicted burnout, whereas self-efficacy (OR = 0.82, 95% CI [−0.77, 0.38], $p = 0.437$) did not.

3.4. Longitudinal Analysis of the Relative Burnout Risk

To analyse the longitudinal association between resilience measures and burnout risk, participants reporting no burnout at study entry ($N = 128$) were investigated. Excluded from the analysis were 19 participants who did not have data for at least two consecutive time-points. Of the 109 remaining participants, 40 participants (36.7%) developed burnout during the course of the study. We calculated multiple Cox regression models, estimating the time to the incidence of burnout predicted by SOC, self-efficacy and self-care, first independently for each predictor and then combined in one model. In separate models, all three resilience measures were associated with reduced burnout risk (SOC: HR = 0.45, 95% CI [−1.18, −0.49], $p < 0.001$; self-efficacy: HR = 0.61, 95% CI [−0.87, −0.19], $p = 0.003$; self-care: HR = 0.68, 95% CI [−1.12, −0.20], $p = 0.012$). In a second step, we calculated a combined model that predicted the time to the development of burnout including all three predictors. In this model, only SOC and self-care were significantly associated with reduced burnout risk (Table 4).

Table 4. Longitudinal association between sense of coherence, self-efficacy, self-care and burnout risk during the course of the study in a combined cox regression model.

	HR [a]	95% CI [a]	*p* [a]
Sense of coherence	0.58	[−1.04, −0.14]	0.004 **
Self-efficacy	0.77	[−0.61, 0.16]	0.112
Self-care	0.59	[−1.04, −0.22]	0.002 **

HR=Hazard Ratio, CI = Confidence Interval [a] CIs are based on 2000 bootstrap samples, * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

4. Discussion

In this prospective study, we investigated the longitudinal association between specific resilience measures and burnout in a Swiss population of professional caregivers working in youth residential care. To our knowledge, this is the first longitudinal analysis of the association between burnout, SOC, self-efficacy and self-caring behaviour in the setting of youth residential care.

In line with previous research, SOC, self-efficacy and self-care were related to lower burnout symptoms in work-related and personal domains [19,21,32,35,36]. This was especially the case for cognitive symptoms, such as perceiving things negatively and reacting instead of acting. At study entry, individuals reporting higher values in all three resilience measures, especially SOC and self-care, had lower odds for burnout.

Our results indicate sociodemographic differences in individual resilience. Both SOC and perceived self-efficacy were positively associated with sex (identifying as male), older age and having children. We found no link to relationship status or years of work experience, but SOC was positively associated with number of employment years. Despite our findings, reports on sex differences vary and it remains an unstable predictor for burnout or resilience [25,41,42]. Older age, on the other hand, has been reported as a strong predictor for greater resilience such as SOC and lower burnout levels [24,38,40,62]. Although previous studies were not all in agreement, older caregivers may have developed stronger beliefs in their own ability to deal with stressful situations with growing experience and years of employment, using their available resources more effectively [27]. Alternatively, a survival bias may result in more resilient caregivers 'surviving' for longer, while those who are less resilient leave earlier [23,42]. The association between resilience, having children and employment years may indirectly tie in with older, more resilient individuals also being more likely to have children or be long-term employees [44]. Critical life events may change a person's world views and affect SOC [63,64]. It seems plausible that as a life-changing event, having children could influence such perceptions favourably. Studies have reported that spending time with loved ones and developing meaningful relational roles outside of work have a protective effect [24,44,65]. Parents may also practice stricter work-life balance, which is beneficial for coping with job demands. Contrary to a recent study on self-care practices of child welfare workers, we found no sociodemographic differences in self-care [22]. Alkema et al. presumed that unrelated to age, professionals who take better care of themselves in various areas are less likely to leave the profession early due to burnout [23]. Thus, all individuals, no matter age or experience, are susceptible if they do not care for themselves.

During the course of our study, higher resilience scores reduced the risk of burnout. When all three measures were compared in the same statistical model, we found SOC and self-care to have the strongest protective effect. Our findings corroborate with an analysis on risk and protective factors in nursing, where no direct association between self-efficacy and burnout was found [41]. The SOC and self-efficacy constructs overlap in many respects, both including a cognitive component enabling the anticipation of events, a motivational component determining goal setting and a personal investment and a capability component, i.e., belief in one's coping abilities [24]. This may explain the non-significant effect of self-efficacy when including all three resilience measures in the same model.

SOC was neither associated with the number of personal nor work-related stressors, suggesting SOC has little to do with whether stressors are perceived, but rather determines how they are coped with, i.e., are they still manageable, meaningful and comprehensible? A unique component of SOC is the aspect of 'meaningfulness', where there are no outcome expectancies and life events are understood as challenges rather than burdens [20]. Trap et al. found that individuals with low SOC are most likely to increase their SOC level [24]. As suggested by Vinje et al. in their professional training program, health promotion practices should therefore focus on expanding capacities in such individuals [66]. Interventions focusing on coping, problem-solving, cognitive therapy or lifestyle changes have been reported as effective [19].

Our findings on self-caring practices of professional caregivers support their relevance as a buffer in stressful work environments. Supporting our findings, Salloum et al. found that addressing self-care needs

that are relevant for working with traumatized clients, such as trauma-informed self-care, which includes seeking supervision, working within teams, balancing caseloads and developing a plan for work-life balance, is protective against the development of burnout [21]. Furthermore, some authors have suggested that taking part in a variety of self-care strategies, not just one or two, may be more effective in managing symptoms [10,22]. Nevertheless, a recent systematic review concluded that self-care still takes a back seat in social work, and little is known about the efficacy of specific self-care practices [22,67]. More intervention research and integration into educational programs is needed for improving self-care competency and maintaining an empowered and healthy workforce.

The present study has certain limitations. Since reports on burnout and resilience were based solely on self-reports, a certain report/recall bias should be considered. However, the advantage of this is that inter-individual differences in stress perception are taken into account. With varying individual time intervals and measurements, we did not have four analogous cross-sectional measuring points to determine if sociodemographic results and correlations described at study entry remained consistent throughout the study period. Nevertheless, we were able to take this into account in the longitudinal analyses. Due to the high care standards found in institutions approved by the Swiss Federal Office of Justice, generalizations on an international scope should be made cautiously. The selection bias of participating youth welfare institutions may contribute to underestimations of burnout and overestimations of resilience. Unsurprisingly, we found SOC, self-efficacy and self-care to be highly correlated with one another, making individual interpretations more difficult. Some authors have suggested resilience to be a holistic tendency rather than being concept specific, so analysing the resilience measures in separate models as well as in the same model took this into account [22,59,60]. Furthermore, we did not systematically control for team dynamics and institutional problems, which may also have a relevant impact on work satisfaction and burnout.

5. Conclusions

Youth welfare organizations would benefit from future research assessing the effectiveness of professional and educational training programs focused on enhancing SOC and self-care practices. In the interest of cultivating a stable work environment, not only employees, but also leadership styles, case reviews and supervision should encourage staff engagement and self-care. In particular, younger employees just starting off in their careers and individuals perceiving work stressors as uncontrollable, meaningless and overwhelming could benefit in regard to performance, satisfaction, organizational commitment, as well as opting to stay on. We, however, also argue that the self-optimization of employees has its limits and is no substitution for organizationally embedded solutions to optimizing work environments. When drawing comparisons to the general population, many professional caregivers remaining on the job demonstrate above-average coping capacities. It is the duty of occupational policies to ensure that individuals with average, adequate health practices can enjoy their profession and continue working long-term with the vulnerable clients in their care.

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5.0 Discussion

Youth residential care aspires to provide a supportive and stable setting for children and adolescent clients, many of whom show severe psychopathological symptoms including aggressive behavior. In response to client care termination sentiments and high employee turnover rates, there is a growing interest to explore health consequences and potential intervention strategies to interrupt cycles of disrupted relationships. We aimed to explore emotional and psychophysiological stress reactions associated with care disruptions and client aggression, as well as resilience factors that may protect against such stressors. Research was conducted with clients and professional caregivers in German and Swiss youth residential care services. To date, longitudinal research and psychophysiological data in residential care settings are extremely limited.

Our studies on children and adolescents living in out-of-home care emphasize the accumulation of disadvantageous life circumstances and health problems in this vulnerable population. In our Swiss residential care sample, the average age for out-of-home placements was 14 years, suggesting that many remained in difficult home environments for most of their childhood. Reported impaired or disrupted care included parental mental illness, addiction or incarceration, death of caregivers or siblings, and frequent changes in primary caregivers. Three out of four clients demonstrated clinically relevant behavioral problems. In the German closed residential care sample, clients with clinically aggressive behavior were reported to have experienced an average of six to seven early adverse life experiences, including parental separation and unemployment, peer and family violence, emotional abuse, and mobbing at school. On average, they experienced two previous placement disruptions since entering the residential care system, but some experienced as many as nine disruptions.

Our findings indicate a higher risk for HPA-axis dysregulation and psychopathological symptoms in clients who have experienced early impaired or disrupted care. We found a significant association between hair cortisol/DHEA ratios and clients who experienced maternal illness or frequent changes of their primary caregiver, caused by a chronic upregulation of cortisol and downregulation of DHEA. HPA-axis dysregulation was also positively associated with anxious/depressive symptoms, attention problems, social and thought problems. The first months of life and puberty are considered critical periods for the development of HPA-axis regulation (Gunnar & Quevedo, 2006). During the first months of life, stable attachment figures are reflected in HPA-axis activation, while during puberty the rise in HPA-axis reactivity increases vulnerability to stress exposure and the development of psychopathological symptoms (Albers et al., 2008; Andersen & Teicher, 2009; van Andel et al., 2014; Widom et al., 2018; Rasic et al., 2014). The association between disrupted ties and youths' emotional

and psychophysiological health highlights the importance of stable care during childhood and adolescence.

Regarding professional caregivers, we found that exposure to verbal and physical client aggression increases the risk of HPA-axis dysregulation and burnout. Over the course of four years, the risk of developing high hair cortisol levels increased if professional caregivers reported exposure to both verbal and physical client aggression during the preceding three months. Exposure to verbal aggression alone increased the risk of developing burnout symptoms, such as emotional exhaustion, cynicism, depersonalization, anxiety, and loss of confidence. The severity of accumulated verbal and physical aggression may trigger a chronic activation of underlying coping mechanisms involved in the body's stress response (Guilliams & Edwards, 2010; Harris & Leather, 2011; Stalder et al., 2017). However, the negative effects of nonphysical aggression should not be underestimated. A previous study on adverse work effects in caregivers even found that modifying, quitting or transferring work was more frequent after nonphysical violence than after physical assault (Gerberich et al., 2004). Even though exposure to verbal aggression might be expected during a professional caregiver's shift, being affected by such violations of personal boundaries should also be expected. Prevention and intervention strategies which ideally mitigate the risks of excessive stress, should take into account not only physical, but also verbal aggression. Considering the negative effects of client aggression on professional caregivers, we found, as expected, clients with consistently high aggressive behavior to be more likely to experience placement disruptions.

At the client level, however, positive changes in inner and outer life circumstances coincided with reductions in youths' aggressive behavior in closed residential care. Contributors are perceived improvements in peer relationships, managing school requirements, substance use and suicidal thoughts. This is in line with previous research suggesting that collaborations with schools, parents and peers are highly favorable for developments, and dropping out of school and substance use are particularly high risk factors for unfavorable developments (Andrade et al., 2012; Attar-Schwartz et al., 2017; Büttner et al., 2015; Colder et al., 2013; 2017; Cooley et al., 2015; Erskine et al., 2016; Fanti & Henrich, 2010; Gander et al., 2019; Nelson et al., 2014; Yoon et al., 2015). Substance use prevention commonly takes place in schools, which aggressive clients may not be attending regularly. A recent analysis demonstrated that in Switzerland, 11 to 15 year old youths in out-of-home care report higher life-time prevalence of cigarette, alcohol and illegal drug consumption than an age-matched nation-wide school population (Jordan et al., 2019; Kind et al., 2019). Active prevention strategies in settings where clients can be reached despite their school absenteeism are needed, for example, within their group homes. Substance use and suicidal thoughts could be understood as mediating (maladaptive) coping strategies in the face of helplessness and hopelessness that facilitate aggressive behavior (Teisl & Cichetti, 2008). Care plans of clients with

aggressive behavior could focus on social competence, remaining persistent with school attendance, adaptive emotion regulation strategies, openly addressing suicidality and substance use, while working closely with available psychiatric services.

Increases in perceived self-efficacy contributed to decreases in clients' aggressive behavior. This supports previous findings which report that developing perceived self-efficacy has a protective effect on aggressive behavior (Farrell et al., 2010; Valois et al., 2013; Zullig et al., 2014). Building on social information processing theory, developing adaptive coping mechanisms and emotion regulation skills might strengthen self-efficacious beliefs – likely because effective coping heightens sense of achievement and control, while also provoking more positive social feedback (Saarni, 1999). Youths might feel less at the mercy of situations and emotions, and more personally responsible for finding solutions to their problems. Our findings suggest that clients with lower clinical aggression levels are more likely to benefit from any care interventions aimed at improving self-efficacy. Interventions could focus on training emotion regulation, providing a sense of control despite restricted settings (e.g. giving choices, behaving transparently, allowing participation in decision-making), celebrating progress and focusing on expanding resources and individual strengths.

At caregiver level, we found sense of coherence and self-caring behavior to have stronger protective effects against burnout over time than perceived self-efficacy. The concepts of self-efficacy and sense of coherence overlap in many respects, both including three components: a cognitive component enabling the anticipation of events, a motivational component determining goal setting, and a personal investment and capability component, i.e. the belief in one's coping abilities (Trap et al., 2015). While self-efficacy is more outcome-oriented, sense of coherence has no outcome expectancies. The aspect of 'meaningfulness' is unique to sense of coherence, where life events are understood as challenges rather than burdens (Antonovsky, 1987). A meta-analysis on sense of coherence in caregiving has reported interventions focusing on coping, problem-solving, cognitive therapy or lifestyle changes as effective (del-Pino-Casado et al., 2019). Addressing self-care needs that are relevant for working with traumatized clients, including seeking supervision, working within teams, balancing caseloads and developing a plan for work-life balance, protects against burnout (Salloum et al., 2015). Furthermore, some authors have suggested that taking part in a variety of self-care strategies, not just one or two, may be more effective in managing symptoms (Steinlin et al. 2015b; Miller et al., 2019). Nevertheless, a recent systematic review concluded that self-care still takes a back seat in social work, and little is known about the efficacy of specific self-care practices (Griffiths et al., 2019; Miller et al., 2019). More intervention research and integration into educational programs is needed for improving self-care competency and maintaining an empowered and healthy workforce.

Our research on clients and professional caregivers in youth residential care points to a number of sociodemographic differences. In closed residential care, girls were more likely to reduce their aggressive behavior than boys. It is possible that girls responded more strongly to the interventions, or alternatively, their aggressive behavior evolves into more covert forms of expression (e.g. passive aggression, cyber bullying) that are overlooked in the implemented psychometric measures for aggressive behavior (Cullerton-Sen et al., 2008). In our samples of professional caregivers, older individuals but also those with shorter careers in the residential care sector reported fewer burnout symptoms and higher resilience levels. Since professional caregiving is often not the first career path, this contradiction may therefore spring from age not directly coinciding with career length. Irrespective of their time in the care sector, older professional caregivers may be more adept in dealing with stressful situations (Molero et al., 2018). Younger individuals just transitioning from school life may still be in the process of acclimatizing to unaccustomed pressures and confrontations, while also being less conscious-minded of self-caring behavior (Merluzzi et al., 2011; Schmid et al., 2017; Steinlin et al., 2017). Additionally, a survival bias may result in more resilient caregivers 'surviving' for longer, while those who are less resilient leave sooner when they are younger (Alkema et al., 2008; Maslach et al., 2001). Being male, having children and being stably employed in the current place of work were also related to higher resilience levels (Trap et al., 2015; Shoji et al., 2016; Lizano & Barak, 2012; Eriksson et al., 2019). This association may indirectly tie in with resilient, older individuals who are also more likely to have children or to be long-term employees (Boyas et al., 2012). Studies have reported that spending time with loved ones and developing meaningful relational roles outside of work, have a protective effect (Trap et al, 2015; Boyas et al., 2012; Eastwood et al., 2008). Parents may also practice stricter work-life balance, which is beneficial for coping with job demands. Regardless of sociodemographic factors, all professional caregivers may become less susceptible to exceeding personal capacities by fostering a sense of coherence in their lives and by utilizing multiple self-care strategies.

5.1 Limitations

The presented research studies have certain limitations. Due to the exploratory nature of the projects and missing data in the repeated measures, the final sample sizes were relatively small, so generalizations should be made with caution. Nevertheless, the presented research provides insight into an important field scarcely researched with longitudinal approaches or psychophysiological parameters. Since recruiting was continuous within participating residential care institutions, the individual time intervals and measurements varied. Such variations were taken into account in the respective statistical analyses. Furthermore, the considered time frames varied between measuring

instruments (e.g. hair cortisol reflected the past six weeks, whereas the burnout scales were anchored to periods of three weeks or seven days), which has the potential to increase error within the statistical analyses. Since reports on client aggression, burnout, psychopathological symptoms and resilience were based solely on self and informant reports, certain report/recall biases should be considered. However, the advantage of this is that inter-individual differences in stress perception are taken into account. Unfortunately, we have no reliable information on reasons for missing data or confounding factors, such as diabetes, alcohol consumption, psychiatric diagnoses, or BMI, which can also impact aggressive behaviour or stress reactions (Stalder et al., 2017). We also have no additional information on intelligence, current treatments (incl. medication) or aggression quality, which may be relevant for reductions in aggressive behaviour (Kavish et al., 2020; Schmid et al., 2014). Due to the research designs, the current studies cannot confidently answer questions of causality and we did not systematically control for team dynamics and institutional problems, which may have a relevant impact on work satisfaction, burnout and decisions to disrupt placements. We acknowledge that there are numerous personal and situational causes and consequences of disrupted care that remain outside of the scope of the addressed research questions.

5.2 Future research

Future research with larger sample sizes and other populations in the care sector (e.g. child and adolescent psychiatry) is needed, whereby both psychological and physiological stressors, resilience factors, as well as individual confounders are taken into account. Next to perceived self-efficacy, an exploration of the sense of coherence and self-caring behavior of clients, which has thus far been neglected, could be explored. Building on the current cross-sectional analysis, longitudinal assessments of psychopathological symptoms and HPA-axis activation in children and adolescents would further our understanding of causality. Established on a theoretical and empirical foundation, we suggest in our ‘Disruption Cycle’ model that early relationship disruptions may exacerbate client aggression. However, more evidence is needed to corroborate this association in residential care.

The presented research seeks to describe current problems in residential care and suggests possible areas to implement interventions. More intervention research is, however, needed to test the effectiveness of implemented strategies, which could instrumentalize HPA-axis reactivity as an objective measure for quality management (Lüdtke et al., 2019; Boparai et al., 2018). Studies report that most placement disruptions occur within the first six months after arrival. It would be valuable to implement programs that focus on developing effective screening methods or preparing care teams prior to clients’ placements, while also equipping professional caregivers with skills needed to surpass a bumpy start with challenging clients without burning out (e.g. Schmid & Kind,

2017).Trauma-sensitive care focuses on re-establishing inner and outer security, offering secure relationships, transparency, participation and needs orientation, and could be an appropriate approach to tackle care instability (Schmid & Fegert, 2015a; 2015b; Schmid & Lang, 2012). Furthermore, an empirical basis for understanding exceptions to the rule, where swift placement terminations still remain the most conducive course of action would further facilitate reflected placement decision-making.

5.3 Conclusion

During the course of our lives, we accumulate various positive and negative effects on health and wellbeing. Our preliminary findings in vulnerable children and adolescent clients suggest that psychosocial risk factors early in life - disrupted care in particular - affect the body's underlying functions, months or even years later. Such psychophysiological dysregulations may exacerbate mental and physical health, which can impede future development and partaking in society. Stable relationships and continued care are of utmost importance.

Professional caregivers in youth residential care are saddled with the challenge of caring for highly vulnerable clients. Among other difficulties, their working lives are peppered with emotional and psychophysiological stressors, including client aggression. Our findings in closed youth residential care suggest that clients' aggressive behavior can be reduced by incorporating various life domains into care plans. In the interest of cultivating a stable living and working environment, it may be effective, at client level, to focus on social competence, emotion regulation, early substance use prevention, addressing suicidal thoughts and providing a safe, uninterrupted environment that encourages self-efficacy. At caregiver level, especially younger employees just starting off in their caregiving careers, and individuals who perceive work stressors as uncontrollable, meaningless and overwhelming could benefit from case reviews, supervision and proactive leadership styles that encourage staff engagement and self-care. When drawing comparisons to the general population, many professional caregivers demonstrate above-average coping capacities. However, individual self-optimization has its limits and is no substitute for solutions embedded within the organisation. Institutional management should feel some responsibility in ensuring that their employees can maintain their necessary thick skin and their soft, emotionally engaged heart, to continue working long-term. The solution should not be for clients and professional caregivers to change institutions, but rather to change the institutions to the extent that stable relationships can be maintained, and cycles of care disruptions can be disrupted.

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